West Coast Charlotte Islands Groundfish Bottom Trawl Survey, August 28th to September 25th, 2006

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by

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ABSTRACT

Workman, G.D., Olsen, N., and Rutherford, K.L. 2007. West Coast Queen Charlotte Islands groundfish bottom trawl survey, August 28th to September 25th, 2006. Can. Manuscr. Rep. Fish. Aquat. Sci. 2804: vii + 44 p.

A bottom trawl survey of the west coast of the Queen Charlotte Islands was conducted on the fishing vessel F/V Viking Storm between August 28th and September 25th, 2006. The survey was jointly conducted and funded by the Canadian Groundfish Research and Conservation Society (CGRCS) and Fisheries and Oceans Canada (DFO). It was the first in what is intended to be a long-term survey series, coordinated with other area-specific surveys that together cover the continental shelf and upper slope of most of the British Columbia coast. The objective of these surveys is to provide fishery-independent abundance indices of all demersal fish species available to bottom trawling, as well as to collect biological samples of selected species.

The survey conducted 114 successful tows from a total of 130. The mean catch per successful tow was 917 kg, averaging about 23 different species of fish and invertebrates in each. The most abundant fish species encountered was Pacific ocean perch followed by rougheye rockfish, and silvergray rockfish. Biological data, including individual length, weight, sex, maturity, and age structure, were collected from 63 different species of fish. Oceanographic data and net geometry were also recorded for most tows, including water temperature, depth, headrope height, and doorspread.

RÉSUMÉ

Workman, G.D., Olsen, N., et Rutherford, K.L. 2007. Relevé au chalut de fond des poissons démersaux sur la côte Ouest des îles de la Reine-Charlotte du 28 août au 25 septembre 2006. Can. Manuscr. Rep. Fish. Aquat. Sci. 2804: vii + 44 p.

Un relevé au chalut de fond a été effectué sur la côte Ouest des îles de la Reine-Charlotte à partir du bateau de pêche F/V Viking Storm entre le 28 août et le 25 septembre 2006. Le relevé a été effectué et financé conjointement par la Canadian Groundfish Research and Conservation Society (CGRCS) et Pêches et Océans Canada (MPO). Il s'agit du premier d'une série de relevés qui s'effectueront sur le long terme, en coordination avec d'autres relevés spécifiques à certaines zones qui ensemble couvriront le plateau continental et le versant ascendant de la plus grande partie du littoral de la Colombie-Britannique. L'objectif de ces relevés est d'obtenir des données indépendantes des pêches sur l'abondance de toutes les espèces de poissons démersaux accessibles au chalut de fond ainsi que d'obtenir des échantillons biologiques de certaines espèces choisies.

Au total, le relevé a permis d'effectuer 114 passages au chalut fructueux sur 130. Le poids total moyen des prises par trait de chalut était de 917 kg et on comptait en moyenne 23 espèces différentes de poissons et d'invertébrés par trait. L'espèce la plus abondante était le Sébaste à longue mâchoire, suivi par le Sébaste à œil épineux et le Sébaste argenté. Des données biologiques, notamment la longueur, le poids, le sexe, le degré de maturité, l'âge ont été recueillies pour 63 espèces différentes de poissons. Des données océanographiques et la géométrie des filets ont également été enregistrées pour la plupart des traits, notamment la température et la profondeur de l'eau, la hauteur de la ralingue supérieure et la largeur de la porte.

INTRODUCTION

In 2003 a report by the Pacific Scientific Advice Review Committee (PSARC) recommended development of fishery-independent relative abundance indices using bottom trawl surveys in British Columbia waters (Sinclair et al., 2003). As an initial step, it recommended that a pilot survey be conducted in PMFC major areas 5A and 5B (Queen Charlotte Sound). This region was recommended in part because it is not covered by other bottom trawl surveys and it represents a significant portion of the commercial bottom trawl fishery.

The first Queen Charlotte Sound survey was successfully completed in the summer of 2003 (Olsen et al., 2007). Following that, additional surveys were planned for the west coast of Vancouver Island beginning in 2004, Hecate Strait beginning in 2005, and the west coast of the Queen Charlotte Islands beginning in 2006. These surveys are to be conducted on a rotating biennial schedule with the Queen Charlotte Sound and Hecate Strait surveys conducted in odd-numbered years and the west coast Vancouver Island and west coast Queen Charlotte Islands surveys conducted in even-numbered years. Together they provide comprehensive coverage of the continental shelf and upper slope of the British Columbia coast (Figure 1).

This document provides a brief synopsis of the 2006 west coast Queen Charlotte Islands groundfish bottom trawl survey, including the methods used and data collected. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results.

METHODS

VESSEL AND FISHING GEAR

The survey was conducted aboard the commercial stern trawler F/V Viking Storm (Figure 2). The trawl net used was an Atlantic Western IIA box trawl (Table 1) connected to 953 kg Thyboron 104 doors with 11 m door legs.

STAFF SUMMARY

A total of 15 personnel were involved in the survey, which was split into four sections, each between seven and nine days duration, with 10 staff in each. The Canadian Groundfish Conservation and Research Society (CGCRS) funded employees of Leader Fishing Ltd. and Archipelago Marine Research Ltd. (AMR). All other staff were funded by Fisheries and Oceans Canada (DFO) (Table 2).

SURVEY DESIGN

The study area consists of the west coast of the Queen Charlotte Islands, from approximately latitude 52° 45' N to latitude 54° 35' N, covering depths from 150 to 1,300 meters (Figure 3), and categorized into five distinct strata (Table 3). The northern region, extending into Dixon Entrance, is nearly contiguous with the north-western most extent of the Hecate Strait survey except for a gap around Learmonth Bank (Figure 1), which we omitted from the survey to avoid large catches of red tree coral (*Primnoa* sp.) known to inhabit the area.

We divided the survey area into a contiguous grid of 4 km^2 blocks and from these blocks we randomly selected 125 fishing locations. The number of locations and the allocation of locations across strata were based on an analysis by Sinclair et al. (2003) and were intended to minimize observational error for the most important commercial groundfish species. After reviewing the selected sites with the fishing captain we estimated, based on his assessment, an expected failure rate of about 50% in the shallow stratum due to blocks that occurred on rocky or otherwise untrawlable bottom. To compensate for these expected failures we added 10 randomly selected blocks to the shallow stratum, yielding a pre-survey-wide total of 135 blocks. During the survey, additional randomly selected blocks were added due to higher than expected failure and rejection rates, leading to a final total of 157 blocks (Table 3, Figure 4).

OPERATIONS

Fishing

Fishing normally commenced at sunrise and ended at sunset each day. This yielded a working day length of about 14 hours, starting at approximately seven in the morning and ending at about nine in the evening.

We frequently began fishing immediately on arrival at a fishing location. However, if the captain was not familiar with an area we would spend a few minutes traversing the block and examining the depth sounder profile to determine if it was

suitable for trawling. If it was not, we designated the location as "rejected", removed it from the sampling frame and moved on to the next location.

When trawling, the captain would attempt to tow through the center of the 4 km^2 fishing block, usually following a depth contour. However, where the bottom topography made this difficult or impossible, the captain would trawl wherever he felt he could obtain a successful result, with the stipulation that at least half of the total trawl track had to be within the block.

The ratio of warp length to depth ("scope") was not kept constant and was left to the discretion of the captain. It normally varied from about three for shallow tows to around two for deeper tows (Figure 5 and Table 4).

To determine the start of each tow, we monitored the real-time net sensor data to establish when the net reached the sea floor and the headrope collapsed to a height of about three to four meters; at this point we considered the net to be actively fishing. The target on-bottom time was 20 minutes for shallow tows and 40 minutes for tows in the deepest stratum. However, for pragmatic reasons we accepted tows with on-bottom times of at least 75% of the target time. This allowed us to retain many tows that would otherwise have been failures due to hang-ups or early haul-backs.

The result of trawling was either a successful tow, or a hang-up or tear-up of the trawl net. In the event of a hang-up or tear-up, we would either designate the location as "aborted", or try to trawl again in a different part of the block.

Any locations that were rejected or aborted were deemed unsuitable for trawling and we permanently removed them from the sampling frame for all future surveys. Thus, we expect that the total number of available fishing locations will gradually diminish over the duration of the survey series. This practice should lead to more efficient and cost-effective surveys in the future, as untrawlable regions are gradually identified and removed.

Gear and Oceanographic Sensors

The trawl net was equipped with a variety of real-time sensors including temperature, depth, doorspread, current velocity, and headrope height. These sensors transmitted data to a bridge computer once per second and allowed us to continually monitor the net during fishing. In addition to these real-time sensors, we also attached data-logging probes to collect water temperature, net depth, salinity, and dissolved oxygen (Seabird 39 and Seabird 16plus probes) and contact of the trawl net with the sea floor (NMFS Bottom Contact Sensor).

Catch Processing

Codend contents were dumped into a raised rectangular sorting bin approximately three meters long by two meters wide. Any catch that did not fit into the sorting bin was dumped into a spillway aft of the bin. We completely sorted and weighed the catch to species, except when the catch was too large to be sorted in a reasonable amount of time. In these rare cases we obtained the captain's estimate of total weight, then sorted and weighed all but the dominant species, whose weight was then obtained by subtraction.

Biological Sampling

While the primary purpose of the survey was to generate fishery-independent indices of relative abundance, our second goal was to collect associated biological information on the size, sex, and age composition of selected species. In particular, our biological sampling priorities were to collect length and sex frequencies on all species in the catch of each tow (subject to a minimum number of specimens criteria), to collect representative samples of specimen length and weight, and to collect age samples for selected species.

We selected age samples from the dominant catch by weight in each tow, as well as certain species deemed high priority due to concerns over stock status. Otoliths were collected from rockfish and flatfish species while fin clips were taken from lingcod and Pacific cod.

RESULTS

FISHING

We divided the survey into four sections of seven to nine days. This duration was short enough that we were able to retain a significant amount of the catch, which was sold at the end of each leg, and also allowed us to rotate the science crews. The survey began and ended at the Pacific Biological Station in Nanaimo, while the mid-survey offloads and crew changes were performed in Prince Rupert.

From a total of 29 survey days, 5 days in total were required for travel at the start and end of the survey, 4 days were required for offloading catch and changing crews, and 2 days were lost to inclement weather. Thus, we ended with a total of 18 full fishing days in which time we conducted 130 tows, of which 114 were successful and 16 were unsuccessful due to hang-ups or tear-ups, for an average of just over 6 successful tows per fishing day, or about 4 successful tows per survey day (Table 5).

The final status of the 2006 sampling frame includes 114 successfully fished locations, 33 locations rejected prior to fishing, and 10 locations rejected after one or more failed fishing attempts (Figure 6).

CATCH

Catch weight per tow was typically less than 2,000 kg, averaging 917 kg, and we observed an average of 23 species per tow (Figure 7 and Figure 8). We caught a total of 104,556 kg of fish and invertebrates. Most of this (104,177 kg) consisted of 108 different taxonomic groups of fish, including 24 rockfish taxa and 10 flatfish taxa. The remainder (378 kg) consisted of 111 invertebrate groups (Table 6). Of the fish species, Pacific ocean perch was the most dominant by weight, followed by rougheye rockfish, silvergray rockfish, and sharpchin rockfish (Table 7). Significant amounts of the commercially viable fish catch, especially Pacific ocean perch, were offloaded with the proceeds helping to offset the costs of the survey (Table 8).

SAMPLES AND SPECIMENS

We sampled 63 species of fish for attributes such as length, weight, sex, maturity, and age structure (Table 9, Table 10, and Table 11).

GEAR AND OCEANOGRAPHIC SENSORS

We collected Seabird 39 data (water temperature and depth) from 106 tows, and Seabird 16plus data (water temperature, depth, salinity, and dissolved oxygen) from 92 (Table 12, Figure 9) tows. Although we have not yet analyzed these data in detail, they may prove useful for explaining, or at least correlate to, abundance trends. They will also be added to a growing database of oceanographic data housed at the Institute of Ocean Sciences, British Columbia, and made available to other researchers.

We collected bottom contact data, using the NMFS Bottom Contact Sensor, from 109 tows (Table 12). These data provide a record of the trawl net contact with the sea floor and thus are useful not only for determining the quality and duration of the sea floor contact, but also indicate the relative rugosity of the sea floor (Figure 10).

Net sensor data, including doorspread, current velocity, and headrope height were collected from most tows but were unavailable from several tows due to equipment failure (Table 12, Figure 11).

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Olsen, N., Workman, G. D., and Stanley, R. D. 2007. Queen Charlotte Sound Groundfish Bottom Trawl Survey July 3rd to August 10th, 2003. Can. Manuscr. Rep. Fish. Aquat. Sci. 2782: 58 p.

Table 1. Net specifications

Part	Standard Length	Material	Metric Length	Units	Material
Rigging					
Sweep Line	90	7/8 cable	27.4	m	22 mm cable
Upper bridle	90	3/4 cable	27.4	m	19 mm cable
Lower bridle	90	7/8 cable	27.4	m	22 mm cable
Door Legs	36	7/8 cable	11	m	22 mm cable
Pickups	42	7/8 cable	12.8	m	22 mm cable
Hook ups	8.8 t	BMMDV80	8 mt	mt	BMMDV80
Net frame					
Headline	74.5	7/16" Long link chain	22.7	m	11mm Long link chain
Headline floats	90	8" plastic Spheres			200 mm plastic spheres
Riblines		1 1/4 " Polysteel rope			32 mm polysteel rope
Bolsch Line	68.33	1" poly steel rope	20.8	m	25 mm polysteel rope
Fishing Line	107.33	7/16" Long link chain	32.7	m	11mm Long link chain
Foot Rope					
Foot Rope	107.33	5/8 Chain	32.7	m	16 mm chain
Foot rope bosom	14	16 in Tire gear with 2 in Spacing	4.3	m	400 mm tire gear with 50 mm spacing
Root rope wing1	18.33	18" rock hopper, 18 " disks spaced 18 " apart	5.6	m	450 mm rock hopper 450 mm spacing
Root rope wing2	8.83	18" rock hopper, 18 " disks spaced 18 " apart	2.7	m	450 mm rock hopper 450 mm spacing
Web					
Belly	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Square	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Side Panel	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Taper	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Intermediate	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Codend	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Guard Mesh	4.5 or 5 "	Double 4.5 mm Euroline	114 or 127	mm	Double 4.5 mm Euroline
Liner	3/4"	Notless Nylon	19	mm	Notless Nylon

Table 2. Survey personnel for each leg of the survey.

Leg	Dates	Person	Role	Affiliation
1	August 28th to	Chris Roberts	Captain	Leader Fishing
	September 5th	Rick Stanley	Chief Scientist	DFO
		Ed Choromanski	Science	DFO
		Matthew Drake	Science	DFO
		Alicia Hooper	Science	DFO
		Jodie Riley	Science	AMR
		Russell Farrington	Fishing	Leader Fishing
		Wayne Edwards	Engineer	Leader Fishing
		Flo Salm	Fishing	Leader Fishing
		Dave Hemmons	Fishing	Leader Fishing
2	September 6th to	Chris Roberts	Captain	Leader Fishing
	September 12th	Greg Workman	Chief Scientist	DFO
		Dana Haggarty	Science	DFO
		Kristina Anderson	Science	DFO
		Alicia Hooper	Science	DFO
		Jodie Riley	Science	AMR
		Russell Farrington	Fishing	Leader Fishing
		Wayne Edwards	Engineer	Leader Fishing
		Flo Salm	Fishing	Leader Fishing
		Dave Hemmons	Fishing	Leader Fishing
3	September 13th to	Chris Roberts	Captain	Leader Fishing
	September 18th	Greg Workman	Chief Scientist	DFO
		Kristina Anderson	Science	DFO
		Alicia Hooper	Science	DFO
		Jodie Riley	Science	AMR
		Simon Surat	Science	AMR
		Russell Farrington	Fishing	Leader Fishing
		Wayne Edwards	Engineer	Leader Fishing
		Paul Purston	Fishing	Leader Fishing
		Dave Hemmons	Fishing	Leader Fishing
3	September 19th to	Scott McLean	Captain	Leader Fishing
	September 25th	Greg Workman	Chief Scientist	DFO
		Kristina Anderson	Science	DFO
		Alicia Hooper	Science	DFO
		Jodie Riley	Science	AMR
		Simon Surat	Science	AMR
		Russell Farrington	Fishing	Leader Fishing
		Wayne Edwards	Engineer	Leader Fishing
		Paul Purston	Fishing	Leader Fishing
		Dave Hemmons	Fishing	Leader Fishing

Notes: AMR = Archipelago Marine Research
DFO = Fisheries and Oceans Canada

Table 3. Definition of survey strata with the target and delivered tow allocation in each. "Allocated Sites" denotes the number of fishing locations that were selected in order to try and achieve the target tows; many selected sites are rejected prior to fishing or after an unsuccessful fishing attempt.

Depth Stratum Meters	Depth Stratum Fathoms	Area (km2)	Target Tows	Allocated Sites	Successful Tows
150 - 200	82 - 109	399	10	34	6
200 - 330	109 - 180	1,266	57	63	55
330 - 500	180 - 273	1,124	27	28	26
500 - 800	273 - 437	978	16	17	15
800 - 1300	437 - 711	2,274	15	15	12
			125	**157**	**114**

Table 4. Mean warp length and scope by depth interval.

Depth (m)	Mean Warp (m)	Mean Warp (fa)	Mean Scope	Mean Depth (fa)
100 - 150	387	212	2.7	77
150 - 200	454	248	2.7	94
200 - 250	638	349	2.8	125
250 - 300	720	394	2.6	149
300 - 350	801	438	2.5	178
350 - 400	928	507	2.5	204
400 - 450	990	542	2.4	228
450 - 500	1074	588	2.3	260
500 - 550	1234	675	2.3	290
550 - 600	1326	725	2.2	325
600 - 650	1372	750	2.2	346
650 - 700	1326	725	2.0	358
700 - 750	1463	800	2.0	401
750 - 800	1509	825	2.0	415
800 - 850	1876	1026	2.3	455
850 - 900	1390	760	1.6	468
900 - 950	1842	1008	2.0	503
950 - 1000	1692	926	1.7	537
1000 - 1050	1921	1051	1.9	557
1050 - 1100	2149	1176	2.0	592
1100 - 1150	1966	1075	1.7	615
1150 - 1200	2195	1201	1.9	645
1200 - 1250				
1250 - 1300	2198	1202	1.7	691
1300 - 1350	2195	1201	1.7	715

Table 5. Summary of survey operations.

Start: Depart PBS	August 28
End: Offload PBS	September 25
Fishing days	18
Travel days	5
Offload days	4
Weather days	2
Breakdown days	0
Total days	29
Total tows	130
Keeper tows	114
Unusable tows	16
Inspected un-fished blocks	33
Tows per day overall	4.5
Usable tows per day overall	3.9
Usable tows per fishing day	6.3
Mean catch per keeper tow	917
Mean species per keeper tow	23

Table 6. Catch broken down by species groups.

Species Category	**Number of Taxa**	**Weight (kg)**
All fish	108	104,177
Rockfish	24	88,298
Flatfish	10	5,699
Roundfish	9	9,161
Cartilaginous fish	13	796
Other fish	52	223
Invertebrates	111	378

Table 7. All captured species, ordered by total catch weight, showing number of tows in which the species occurred, total catch weight, maximum and mean per-tow catch weight, and relative abundance and relative error from bootstrapped area expanded estimates.

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Relative Abundance	Relative Error
Pacific ocean perch	76	54,463.2	8,164.7	716.6	31.047	0.24
Rougheye rockfish	53	10,826.7	2,235.6	208.2	10.492	0.24
Silvergray rockfish	58	8,052.6	4,040.0	138.8	6.640	0.54
Sharpchin rockfish	61	5,314.7	902.8	87.1	2.586	0.25
Shortspine thornyhead	106	3,828.4	147.8	36.1	3.327	0.08
Pacific hake	53	3,534.2	434.7	66.7	3.941	0.22
Sablefish	75	3,386.2	1,079.8	45.1	5.235	0.40
Arrowtooth flounder	94	2,928.7	407.7	31.2	3.132	0.21
Dover sole	94	1,282.8	72.1	13.6	1.081	0.11
Shortraker rockfish	23	1,252.9	655.5	54.5	0.912	0.49
Rex sole	94	932.8	72.6	9.9	0.744	0.15
Yellowmouth rockfish	24	919.5	269.7	38.3	0.451	0.41
Redstripe rockfish	22	754.3	187.1	34.3	0.399	0.37
Longspine thornyhead	31	602.8	44.1	19.4	0.870	0.15
Giant grenadier	27	596.2	69.1	22.1	0.974	0.12
Pacific grenadier	24	595.6	155.8	25.9	1.451	0.38
Canary rockfish	4	551.4	252.5	137.9	0.723	0.52
Rosethorn rockfish	56	483.8	55.2	8.6	0.278	0.21
Redbanded rockfish	63	433.3	77.1	6.9	0.290	0.19
Longnose skate	34	415.3	32.3	12.2	0.326	0.19
Widow rockfish	13	324.9	254.0	25.0	0.274	0.80
Pacific cod	37	316.4	43.6	8.6	0.222	0.24
Popeye	21	288.4	61.7	14.4	0.562	0.24
Pacific halibut	28	287.4	39.6	10.3	0.286	0.20
Lingcod	25	268.7	37.8	10.7	0.211	0.24
Darkblotched rockfish	9	266.1	208.2	29.6	0.173	0.78
Walleye pollock	61	174.0	27.1	2.9	0.139	0.21
Petrale sole	15	168.1	50.4	12.0	0.248	0.17
Spotted ratfish	44	165.2	33.4	3.8	0.115	0.21
Pacific flatnose	30	89.1	9.7	3.0	0.141	0.17
Schoolmaster gonate squid	35	86.7	11.6	2.6	-	-
Greenstriped rockfish	14	69.4	29.6	5.0	0.067	0.46
Spiny dogfish	11	59.6	14.2	6.0	0.068	0.24
Glass sponges	40	59.0	23.2	2.4	-	-
Bocaccio	9	55.0	10.8	6.1	0.041	0.36
Primnoa	9	51.8	34.7	7.4	-	-
Aleutian skate	5	49.3	17.2	9.9	0.057	0.69
Chum salmon	10	49.0	7.7	5.4	0.032	0.35
Splitnose rockfish	21	46.3	29.0	2.2	0.034	0.61
Blackfin sculpin	56	45.8	5.6	0.9	0.032	0.30
Sponges	23	43.9	21.8	3.7	-	-
English sole	14	37.4	9.0	2.7	0.045	0.44
Roughtail skate	11	26.1	6.0	2.4	0.046	0.30
Harlequin rockfish	27	25.4	4.7	1.0	0.014	0.25

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Relative Abundance	Relative Error
Sandpaper skate	13	24.7	5.0	2.1	0.021	0.34
Prawn	37	24.2	3.7	0.8	-	-
Southern rock sole	1	22.9	22.9	22.9	0.064	0.97
Abyssal skate	2	22.2	14.1	11.1	0.067	0.70
Slender sole	41	20.7	2.3	0.6	0.019	0.22
Anemone	47	17.5	4.1	1.0	-	-
Deepsea sole	18	17.1	2.3	1.1	0.025	0.26
Alaska skate	1	15.3	15.3	15.3	0.007	1.00
Flapjack devilfish	8	14.1	6.3	2.4	-	-
Humboldt squid	2	12.2	6.4	6.1	-	-
Grooved tanner crab	13	11.5	3.3	1.2	-	-
Aurora rockfish	6	11.3	5.9	1.9	0.012	0.57
Twoline eelpout	10	9.4	2.8	0.9	0.014	0.45
Bath sponges	9	9.3	6.9	2.3	-	-
Yellowtail rockfish	3	8.5	4.1	2.8	0.008	0.61
Cabezon	1	8.2	8.2	8.2	0.007	1.01
Big skate	1	7.8	7.8	7.8	0.006	0.99
Robust clubhook squid	1	6.4	6.4	6.4	-	-
Brown cat shark	3	5.1	4.0	1.7	0.003	0.65
Dusky rockfish	1	4.7	4.7	4.7	0.002	0.94
Jellyfish	38	4.4	1.1	0.3	-	-
Ascidians and tunicates	5	4.1	2.8	1.4	-	-
Bigfin eelpout	6	4.0	1.1	0.7	0.005	0.44
Pacific sleeper shark	1	3.6	3.6	3.6	0.004	0.93
Prowfish	2	3.3	1.7	1.6	0.002	0.75
Glass shrimp	15	3.3	3.2	1.6	-	-
Histioteuthidae	24	3.2	1.0	0.4	-	-
Black eelpout	5	3.1	1.0	0.6	0.004	0.48
Blackgill rockfish	2	2.4	1.5	1.2	0.002	0.75
Red king crab	9	2.3	1.2	0.4	-	-
Paralomis multispina	4	1.8	1.3	0.9	-	-
Molpadiidae	24	1.7	0.6	0.3	-	-
Hippasteria californica	17	1.7	0.4	0.2	-	-
Red urchin	2	1.7	1.6	0.8	-	-
Northern lampfish	33	1.5	0.4	0.2	0.003	0.39
Basket stars	13	1.5	0.5	0.3	-	-
Sea urchins	3	1.5	1.1	0.8	-	-
Threadfin grenadier	1	1.5	1.5	1.5	0.006	0.96
Whitebrow skate	1	1.4	1.4	1.4	-	-
Pinpoint lampfish	14	1.3	0.5	0.3	0.002	0.41
Stout blacksmelt	8	1.3	0.6	0.3	0.003	0.61
Pacific viperfish	23	1.2	0.3	0.1	0.002	0.46
Spiny red sea star	3	1.2	0.7	0.4	-	-
Oregontriton	11	1.1	1.0	0.5	-	-

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Relative Abundance	Relative Error
Blacktail snailfish	6	1.0	0.6	0.3	0.001	0.73
Anthozoa	1	1.0	1.0	1.0	-	-
Slender codling	1	1.0	1.0	1.0	0.002	0.96
Purple sea urchins	2	1.0	0.7	0.5	-	-
Solasteridae	13	0.9	0.5	0.2	-	-
Tanner crabs	1	0.9	0.9	0.9	-	-
Wattled eelpout	1	0.8	0.8	0.8	0.000	1.05
Deepsea smelts	9	0.8	0.3	0.2	-	-
Skates	2	0.8	0.6	0.4	-	-
Soft corals	11	0.7	0.4	0.2	-	-
Pacific red octopus	1	0.7	0.7	0.7	-	-
Pacific sanddab	1	0.7	0.7	0.7	0.001	0.92
Phrynophiurida	27	0.6	0.5	0.3	-	-
Fragile urchin	18	0.6	0.5	0.3	-	-
Sea pens	8	0.6	0.5	0.3	-	-
Pygmy rockfish	5	0.6	0.4	0.2	0.000	0.81
Octopus	10	0.6	0.2	0.1	-	-
Fish-eating star	1	0.5	0.5	0.5	-	-
Pearly prickleback	5	0.5	0.3	0.2	0.000	0.64
Benthoctopus	2	0.5	0.3	0.3	-	-
Box crabs	1	0.5	0.5	0.5	-	-
Sea whip	4	0.5	0.5	0.5	-	-
Snakehead eelpout	5	0.5	0.3	0.2	0.001	0.66
Blackbelly eelpout	3	0.4	0.2	0.1	0.001	0.59
Longfin dragonfish	4	0.4	0.2	0.1	0.001	0.65
Sidestripe shrimp	17	0.3	0.3	0.2	-	-
Squids	11	0.3	0.2	0.2	-	-
Crested bigscale	8	0.3	0.3	0.2	0.001	0.89
Blackfin poacher	20	0.3	0.3	0.3	0.000	1.03
Bigeye poacher	10	0.3	0.1	0.1	0.000	0.57
Zoantharia	6	0.3	0.2	0.1	-	-
Vampire squid	1	0.2	0.2	0.2	-	-
Scaly sea cucumber	3	0.2	0.2	0.2	-	-
Sculpins	4	0.2	0.2	0.2	-	-
Barracudinas	3	0.2	0.2	0.2	-	-
Dendronotidae	4	0.2	0.2	0.2	-	-
Dreamers	1	0.2	0.2	0.2	-	-
Pink shrimp (smooth)	22	0.2	0.1	0.1	-	-
Smootheye poacher	2	0.2	0.2	0.2	0.000	1.01
Crimson pasiphaeid	2	0.2	0.2	0.2	-	-
Nearchaster variabilis	12	0.1	0.1	0.1	-	-
Gastropods	4	0.1	0.1	0.1	-	-
Eualus	1	0.1	0.1	0.1	-	-
Diplopteraster multipes	1	0.1	0.1	0.1	-	-

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Relative Abundance	Relative Error
Cheiraster dawsoni	8	0.1	0.1	0.1	-	-
Poraniopsis inflata	4	0.1	0.1	0.1	-	-
Pacific saury	1	0.1	0.1	0.1	0.000	1.01
Paragorgia pacifica	1	0.1	0.1	0.1	-	-
Myxoderma sacculatum	6	0.1	0.1	0.1	-	-
Slim sculpin	1	0.1	0.1	0.1	0.000	0.97
Stomphia	12	0.0	0.0	0.0	-	-
Vampyroteuthidae	1	-	-	-	-	-
Threadfin sculpin	1	-	-	-	-	-
Topshells	1	-	-	-	-	-
Tubeshoulders	2	-	-	-	-	-
Starfish	7	-	-	-	-	-
Synallactidae	2	-	-	-	-	-
Spotfin sculpin	1	-	-	-	-	-
Squat lobster	6	-	-	-	-	-
Slender snipe eel	1	-	-	-	-	-
Snailfishes	14	-	-	-	-	-
Snipe eels	2	-	-	-	-	-
Solemyoida	1	-	-	-	-	-
Spiny ridge shrimp	2	-	-	-	-	-
Spider crabs	5	-	-	-	-	-
Sea cucumber	6	-	-	-	-	-
Sea lilies and feather stars	13	-	-	-	-	-
Sea mouse	1	-	-	-	-	-
Seaslugs	5	-	-	-	-	-
Segmented worms	1	-	-	-	-	-
Slender barracudina	1	-	-	-	-	-
Redclaw crab	5	-	-	-	-	-
Rockfishes	24	-	-	-	-	-
Ronquils	1	-	-	-	-	-
Rose starfish	6	-	-	-	-	-
Scaleless black dragonfishes	3	-	-	-	-	-
Salps	8	-	-	-	-	-
Winged sea star	2	-	-	-	-	-
Yellowleg shrimp	7	-	-	-	-	-
Oplophoridae	1	-	-	-	-	-
Northern pearleye	2	-	-	-	-	-
Northern sculpin	3	-	-	-	-	-
Northern sun star	6	-	-	-	-	-
Morning sun starfish	1	-	-	-	-	-
Mysids	1	-	-	-	-	-
Myxasteridae	1	-	-	-	-	-
Luidiidae	8	-	-	-	-	-

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Relative Abundance	Relative Error
Molluscs	1	-	-	-	-	-
Lanternfishes	6	-	-	-	-	-
Leptychaster	1	-	-	-	-	-
Humpback shrimp	2	-	-	-	-	-
Henricia	11	-	-	-	-	-
Henricia aspera	6	-	-	-	-	-
Henricia longispina	2	-	-	-	-	-
Henricia sanguinolenta	2	-	-	-	-	-
Hippasteria	1	-	-	-	-	-
Paguroidea	1	-	-	-	-	-
Pallid urchin	3	-	-	-	-	-
Pandalid shrimp	3	-	-	-	-	-
Pacific bobtail squid	4	-	-	-	-	-
Pseudarchaster alascensis	6	-	-	-	-	-
Pterasteridae	5	-	-	-	-	-
Pink snailfish	1	-	-	-	-	-
Poachers	1	-	-	-	-	-
Polychaete worms	3	-	-	-	-	-
Chirostylus	2	-	-	-	-	-
Chitons	1	-	-	-	-	-
Closespine snipe eel	2	-	-	-	-	-
Common argid	1	-	-	-	-	-
Cookie star	2	-	-	-	-	-
Coonstripe shrimp	2	-	-	-	-	-
Crangonidae	1	-	-	-	-	-
Doridídae	1	-	-	-	-	-
Cushion star	3	-	-	-	-	-
Cuskpout	1	-	-	-	-	-
Eulachon	1	-	-	-	-	-
Eelpouts	1	-	-	-	-	-
Giant blobsculpin	1	-	-	-	-	-
Goniasteridae	1	-	-	-	-	-
Goose barnacle	1	-	-	-	-	-
Gorgonian corals	3	-	-	-	-	-
Aphroditidae	1	-	-	-	-	-
Aplacophora	8	-	-	-	-	-
Argentines	3	-	-	-	-	-
Amphipods	13	-	-	-	-	-
Blacktip poacher	1	-	-	-	-	-
Blue lanternfish	6	-	-	-	-	-
Blackmouth eelpout	13	-	-	-	-	-
Boltenia	1	-	-	-	-	-
Bryozoa	2	-	-	-	-	-
California headlightfish	14	-	-	-	-	-

Table 8. Offloaded catch weight by species.

Species	Weight (kg)
Arrowtooth flounder	595
Bocaccio	43
Canary rockfish	479
Darkblotched rockfish	309
Dover sole	250
Dusky rockfish	6
English sole	16
Greenstriped rockfish	36
Harlequin rockfish	1
Lingcod	70
Longnose skate	32
Longspine thornyhead	126
Pacific cod	212
Pacific ocean perch	55,846
Petrale sole	10
Redbanded rockfish	859
Redstripe rockfish	908
Rex sole	184
Rosethorn rockfish	214
Rougheye rockfish	11,020
Sablefish	1,518
Sharpchin rockfish	5,728
Shortraker rockfish	1,315
Shortspine thornyhead	3,615
Silvergray rockfish	9,439
Splitnose rockfish	3
Spotted ratfish	33
Walleye pollock	78
Widow rockfish	328
Yelloweye rockfish	2
Yellowmouth rockfish	914
Yellowtail rockfish	38
Total	**94,224**

Table 9. Number of samples and number of recorded biological attributes per species sampled.

Species	Samples	Length	Weight	Sex	Maturity	Age
Abyssal skate	2	3	3	3	0	0
Alaska skate	1	1	1	1	0	0
Aleutian skate	5	6	6	6	0	0
Arrowtooth flounder	33	978	381	978	134	134
Aurora rockfish	4	17	1	17	0	0
Big skate	1	1	1	1	0	0
Black eelpout	1	10	0	0	0	0
Blackfin poacher	1	14	0	0	0	0
Blackfin sculpin	7	195	0	0	0	0
Blackgill rockfish	2	2	2	2	2	2
Blacktail snailfish	1	12	0	0	0	0
Bocaccio	9	15	15	15	15	15
Brown cat shark	3	11	1	11	0	0
Canary rockfish	4	121	55	121	54	54
Chum salmon	9	9	8	6	0	0
Darkblotched rockfish	7	89	89	89	89	89
Deepsea sole	13	23	8	20	0	0
Dover sole	34	1,098	474	1,098	216	216
Dusky rockfish	1	3	0	3	0	0
English sole	5	68	0	68	0	0
Giant grenadier	20	427	72	427	41	42
Greenstriped rockfish	7	190	112	190	0	0
Harlequin rockfish	12	84	2	84	0	0
Lingcod	25	39	22	38	0	0
Longnose skate	33	47	27	44	0	0
Longspine thornyhead	27	1,935	1,236	1,798	441	506
Pacific cod	32	144	45	144	29	29
Pacific flatnose	18	300	34	300	34	34
Pacific grenadier	20	911	182	857	118	135
Pacific hake	26	1,135	432	1,135	155	155
Pacific halibut	28	57	21	3	0	0
Pacific ocean perch	62	4,301	1,181	4,302	595	595
Pacific sanddab	1	7	0	7	0	0
Pacific sleeper shark	1	1	1	1	0	0
Petrale sole	15	194	174	194	169	169
Popeye	15	841	155	841	83	83
Prowfish	2	2	2	1	0	0
Pygmy rockfish	1	4	0	4	0	0
Redbanded rockfish	52	402	368	402	363	364
Redstripe rockfish	14	498	288	498	95	95
Rex sole	44	1,688	468	1,688	245	245
Rosethorn rockfish	43	1,416	568	1,416	368	368
Rougheye rockfish	26	1,108	782	1,109	335	337
Roughtail skate	11	17	13	17	0	0
Sablefish	49	777	239	776	195	195
Sandpaper skate	13	17	12	17	0	0
Sharpchin rockfish	41	2,077	849	2,077	331	331
Shortraker rockfish	26	208	190	207	205	207
Shortspine thornyhead	70	4,076	1,501	4,017	535	552
Silvergray rockfish	28	704	381	704	185	176
Skates	2	4	4	4	0	0
Slender sole	9	114	0	114	0	0
Southern rock sole	1	22	22	22	22	22
Spiny dogfish	4	9	3	9	0	0
Splitnose rockfish	6	166	153	165	53	67
Spotted ratfish	5	182	0	182	0	0
Threadfin grenadier	1	25	0	0	0	0
Twoline eelpout	1	6	0	2	0	0
Walleye pollock	19	248	1	248	0	0
Whitebrow skate	1	1	1	1	0	0
Widow rockfish	4	68	51	68	50	50
Yellowmouth rockfish	9	206	153	206	118	118
Yellowtail rockfish	2	3	1	3	0	0
Total	**969**	**27,337**	**10,791**	**26,761**	**5,275**	**5,385**

Table 10. Numbers of samples (N) and specimens (n) by sample type and species.

Species	Total		Len./Sex		Len./Sex/Wt.		Len./Sex/Wt./Age	
	N	n	N	n	N	n	N	n
Abyssal skate	2	3	0	0	2	3	0	0
Alaska skate	1	1	0	0	1	1	0	0
Aleutian skate	5	6	0	0	5	6	0	0
Arrowtooth flounder	33	978	25	597	4	247	4	134
Aurora rockfish	4	17	3	16	1	1	0	0
Big skate	1	1	0	0	1	1	0	0
Black eelpout	1	10	1	10	0	0	0	0
Blackfin poacher	1	14	1	14	0	0	0	0
Blackfin sculpin	7	195	7	195	0	0	0	0
Blackgill rockfish	2	2	0	0	0	0	2	2
Blacktail snailfish	1	12	1	12	0	0	0	0
Bocaccio	9	15	0	0	0	0	9	15
Brown cat shark	3	11	2	10	1	1	0	0
Canary rockfish	4	121	2	66	1	1	1	54
Chum salmon	9	9	1	1	5	5	0	0
Darkblotched rockfish	7	89	0	0	0	0	7	89
Deepsea sole	13	23	5	11	7	11	0	0
Dover sole	34	1,098	24	624	6	258	4	216
Dusky rockfish	1	3	1	3	0	0	0	0
English sole	5	68	5	68	0	0	0	0
Giant grenadier	20	427	18	355	1	30	1	42
Greenstriped rockfish	7	190	5	78	2	112	0	0
Harlequin rockfish	12	84	10	82	2	2	0	0
Lingcod	25	39	8	17	16	21	0	0
Longnose skate	33	47	9	20	23	26	0	0
Longspine thornyhead	27	1,935	11	699	8	729	8	506
Pacific cod	32	144	18	99	12	16	2	29
Pacific flatnose	18	300	17	266	0	0	1	34
Pacific grenadier	20	911	17	729	1	47	2	135
Pacific hake	28	1,135	18	703	5	277	3	155
Pacific halibut	28	57	12	36	1	1	0	0
Pacific ocean perch	62	4,301	45	3,120	9	586	8	595
Pacific sanddab	1	7	1	7	0	0	0	0
Pacific sleeper shark	1	1	0	0	1	1	0	0
Petrale sole	15	194	5	20	4	5	6	169
Popeye	15	841	13	686	1	72	1	83
Prowfish	2	2	0	0	1	1	0	0
Pygmy rockfish	1	4	1	4	0	0	0	0
Redbanded rockfish	52	402	9	32	4	6	39	364
Redstripe rockfish	14	498	9	209	3	194	2	95
Rex sole	44	1,688	35	1,220	4	223	5	245
Rosethorn rockfish	43	1,416	31	848	5	200	7	368
Rougheye rockfish	26	1,108	12	327	8	445	6	337
Roughtail skate	11	17	2	4	9	13	0	0
Sablefish	49	777	35	535	10	47	4	195
Sandpaper skate	13	17	3	5	10	12	0	0
Sharpchin rockfish	41	2,077	27	1,228	9	518	5	331
Shortraker rockfish	26	208	0	0	1	1	24	189
Shortspine thornyhead	70	4,076	48	2,575	15	949	9	552
Silvergray rockfish	28	704	20	323	5	205	3	176
Skates	2	4	0	0	2	4	0	0
Slender sole	9	114	9	114	0	0	0	0
Southern rock sole	1	22	0	0	0	0	1	22
Spiny dogfish	4	9	2	6	2	3	0	0
Splitnose rockfish	6	166	3	13	2	86	1	67
Spotted ratfish	5	182	5	182	0	0	0	0
Threadfin grenadier	1	25	1	25	0	0	0	0
Twoline eelpout	1	6	1	6	0	0	0	0
Walleye pollock	19	248	18	247	1	1	0	0
Whitebrow skate	1	1	0	0	1	1	0	0
Widow rockfish	4	68	2	17	1	1	1	50
Yellowmouth rockfish	9	206	6	53	1	35	2	118
Yellowtail rockfish	2	3	1	2	1	1	0	0
Total	**969**	**27,337**	**563**	**16,519**	**215**	**5,406**	**168**	**5,367**

Table 11. Statistics of individual length and weight, and sex proportion by species.

Species	Length (cm)			Weight (kg)			Sex Proportion	
	Min.	Max.	Mean	Min.	Max.	Mean	Male	Female
Abyssal skate	22	138	95	7.0	14.1	10.5	0.67	0.33
Alaska skate	134	134	134	15.3	15.3	15.3	0.00	1.00
Aleutian skate	83	139	108	3.3	17.2	8.2	0.17	0.83
Arrowtooth flounder	11	78	44	0.0	4.6	0.9	0.42	0.58
Aurora rockfish	14	38	32	0.6	0.6	0.6	0.35	0.65
Big skate	109	109	109	7.8	7.8	7.8	1.00	0.00
Black eelpout	24	30	27	-	-	-	0.00	0.00
Blackfin poacher	8	18	15	-	-	-	0.00	0.00
Blackfin sculpin	6	24	15	-	-	-	0.00	0.00
Blackgill rockfish	41	46	44	1.0	1.5	1.2	0.50	0.50
Blacktail snailfish	9	14	12	-	-	-	0.00	0.00
Bocaccio	55	82	68	2.9	7.3	4.5	0.60	0.40
Brown cat shark	42	59	50	0.5	0.5	0.5	1.00	0.00
Canary rockfish	28	65	53	1.3	3.9	2.5	0.43	0.57
Chum salmon	66	81	73	3.9	7.8	5.8	0.56	0.11
Darkblotched rockfish	33	54	44	0.7	2.7	1.5	0.60	0.40
Deepsea sole	9	44	33	0.0	1.0	0.6	0.61	0.26
Dover sole	24	64	39	0.2	2.2	0.7	0.80	0.20
Dusky rockfish	40	42	41	-	-	-	0.00	1.00
English sole	25	45	35	-	-	-	0.38	0.62
Giant grenadier	42	122	66	0.4	9.8	1.1	0.41	0.59
Greenstriped rockfish	18	35	29	0.1	0.6	0.4	0.56	0.44
Harlequin rockfish	15	35	22	0.1	0.2	0.2	0.55	0.45
Lingcod	62	119	88	3.4	15.1	7.0	0.03	0.95
Longnose skate	55	139	106	1.1	20.0	9.3	0.40	0.53
Longspine thornyhead	5	57	19	0.0	0.5	0.1	0.48	0.44
Pacific cod	32	86	56	0.7	6.4	2.4	0.42	0.58
Pacific flatnose	18	49	33	0.0	0.6	0.2	0.59	0.41
Pacific grenadier	5	69	40	0.0	2.0	0.4	0.43	0.51
Pacific hake	40	93	48	0.4	1.7	0.7	0.39	0.61
Pacific halibut	54	147	73	1.6	39.6	6.4	0.00	0.05
Pacific ocean perch	17	58	39	0.1	2.0	0.9	0.49	0.51
Pacific sanddab	19	27	23	-	-	-	0.29	0.71
Pacific sleeper shark	78	78	78	3.6	3.6	3.6	0.00	1.00
Petrale sole	29	53	41	0.3	1.8	0.7	0.67	0.33
Popeye	17	56	39	0.1	0.6	0.3	0.49	0.51
Prowfish	50	53	52	1.6	1.7	1.6	0.00	0.50
Pygmy rockfish	17	20	18	-	-	-	0.25	0.75
Redbanded rockfish	10	330	35	0.0	4.7	0.8	0.49	0.51
Redstripe rockfish	24	45	35	0.2	1.1	0.6	0.39	0.61
Rex sole	18	46	32	0.1	0.6	0.2	0.62	0.38
Rosethorn rockfish	12	40	26	0.0	0.6	0.3	0.51	0.49
Rougheye rockfish	19	85	47	0.2	10.7	1.7	0.55	0.45
Roughtail skate	22	86	56	0.6	3.3	2.0	0.29	0.71
Sablefish	36	565	67	1.3	12.1	3.2	0.70	0.30
Sandpaper skate	17	68	56	0.3	3.7	1.6	0.35	0.65
Sharpchin rockfish	11	67	28	0.0	0.8	0.4	0.48	0.52
Shortraker rockfish	12	102	68	0.7	21.4	6.5	0.45	0.54
Shortspine thornyhead	5	73	27	0.0	6.7	0.3	0.53	0.45
Silvergray rockfish	36	65	52	0.8	3.0	1.8	0.52	0.48
Skates	23	40	29	0.1	0.5	0.2	0.00	1.00
Slender sole	16	30	23	-	-	-	0.36	0.64
Southern rock sole	29	52	42	0.3	1.9	1.0	0.00	1.00
Spiny dogfish	67	98	85	2.7	4.6	3.6	0.22	0.78
Splitnose rockfish	5	38	19	0.0	1.1	0.2	0.45	0.55
Spotted ratfish	9	49	19	-	-	-	0.46	0.54
Threadfin grenadier	8	40	22	-	-	-	0.00	0.00
Twoline eelpout	21	58	36	-	-	-	0.00	0.33
Walleye pollock	18	63	37	1.3	1.3	1.3	0.44	0.56
Whitebrow skate	68	68	68	1.4	1.4	1.4	0.00	1.00
Widow rockfish	46	57	51	1.7	2.8	2.1	0.57	0.43
Yellowmouth rockfish	30	55	46	0.3	2.3	1.6	0.35	0.65
Yellowtail rockfish	51	56	53	-	-	-	0.00	1.00

Table 12. Data collected from net sensors, showing the number of tows from which each data type was collected (total number of survey tows is 130).

Sensor	Attribute	Number of Tows	Number of Records
NMFS Bottom Contact Sensor	Bottom contact sensor tilt angle	109	34,833
Scanmar Scanbas SRU 06 / SGM 15	Bottom depth	112	207,206
	Cross-current water velocity at net depth	108	212,098
	Density of fish in net	109	136,639
	Net depth	109	217,370
	Trawl net doorspread	112	223,708
	Trawl net footrope to headline distance (opening)	109	136,639
	Vessel direction - compass bearing true north	112	242,578
	Vessel position - latitude	112	242,578
	Vessel position - longitude	112	242,578
	Vessel speed over ground	112	242,578
	Water temperature at net depth	111	212,812
	Water velocity at net depth	108	212,098
Seabird SBE16plus Seacat Profiler	Dissolved oxygen	92	196,236
	Net depth	92	196,236
	Salinity at net depth	92	196,236
	Water temperature at net depth	92	196,236
Seabird SBE39 Temperature and Pressure Sensor	Net depth	106	58,095
	Water temperature at net depth	106	58,095

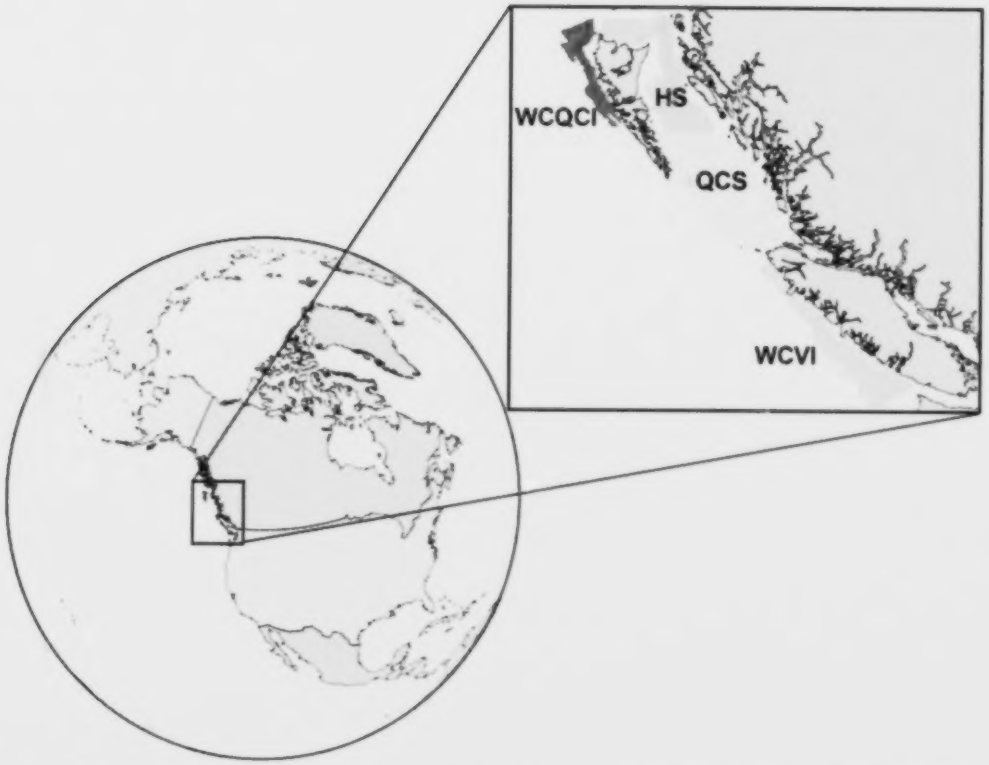

Figure 1. Locations of the modern groundfish trawl surveys on the coast of British Columbia, Canada. WCQCI = west coast of Queen Charlotte Islands; HS = Hecate Strait; QCS = Queen Charlotte Sound; WCVI = west coast of Vancouver Island.

Figure 2. The commercial stern trawler F/V Viking Storm.

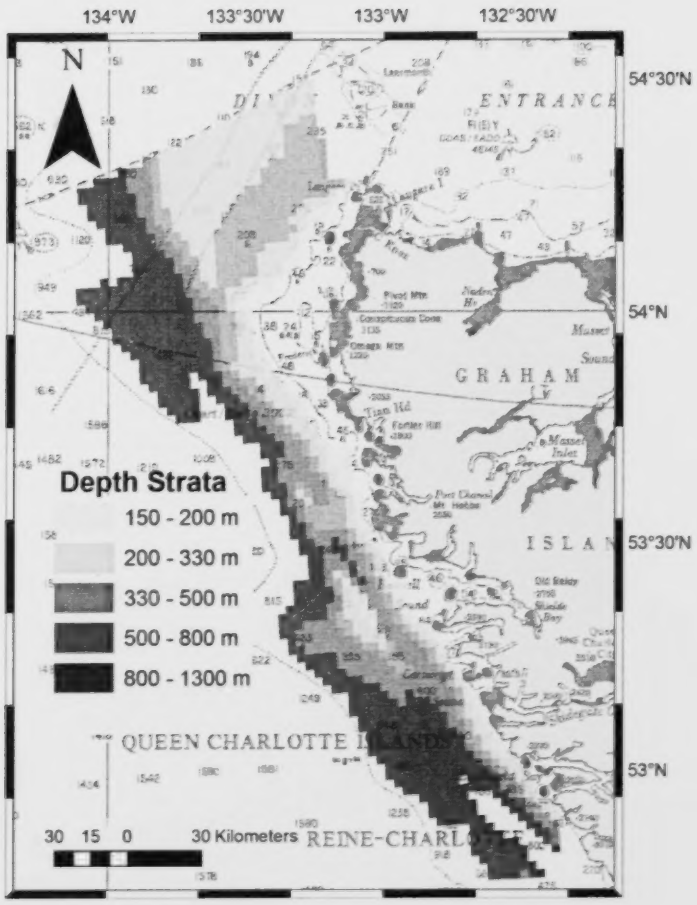

Figure 3. Queen Charlotte Islands study area showing the depth strata covered by the survey.

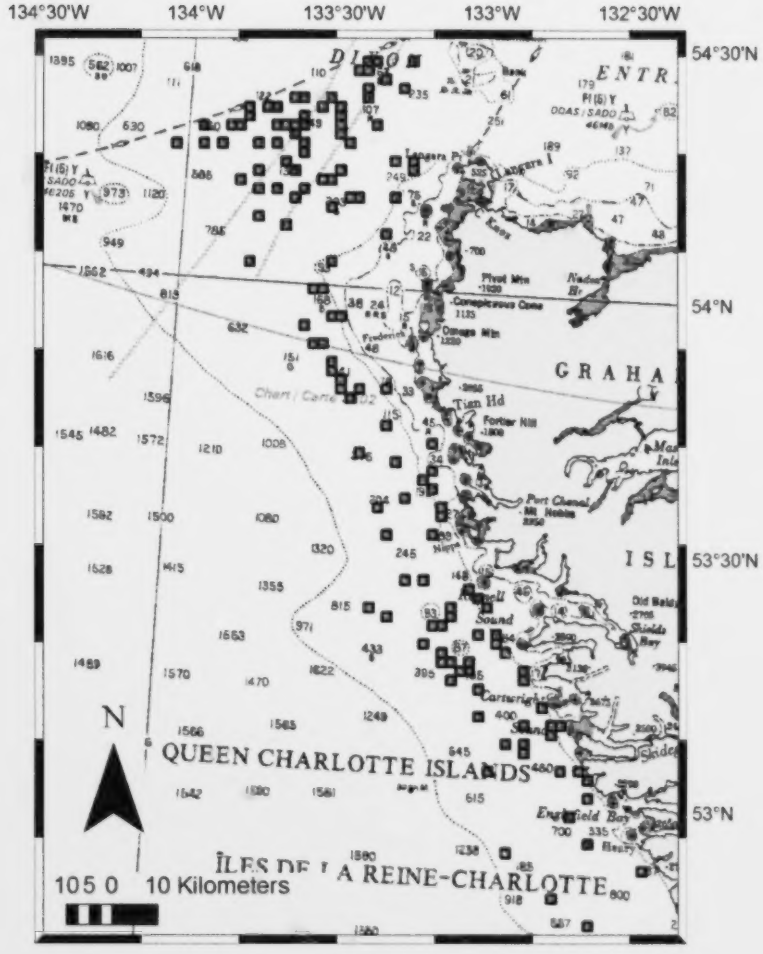

Figure 4. Initial status of the sampling frame showing the 135 randomly selected fishing locations.

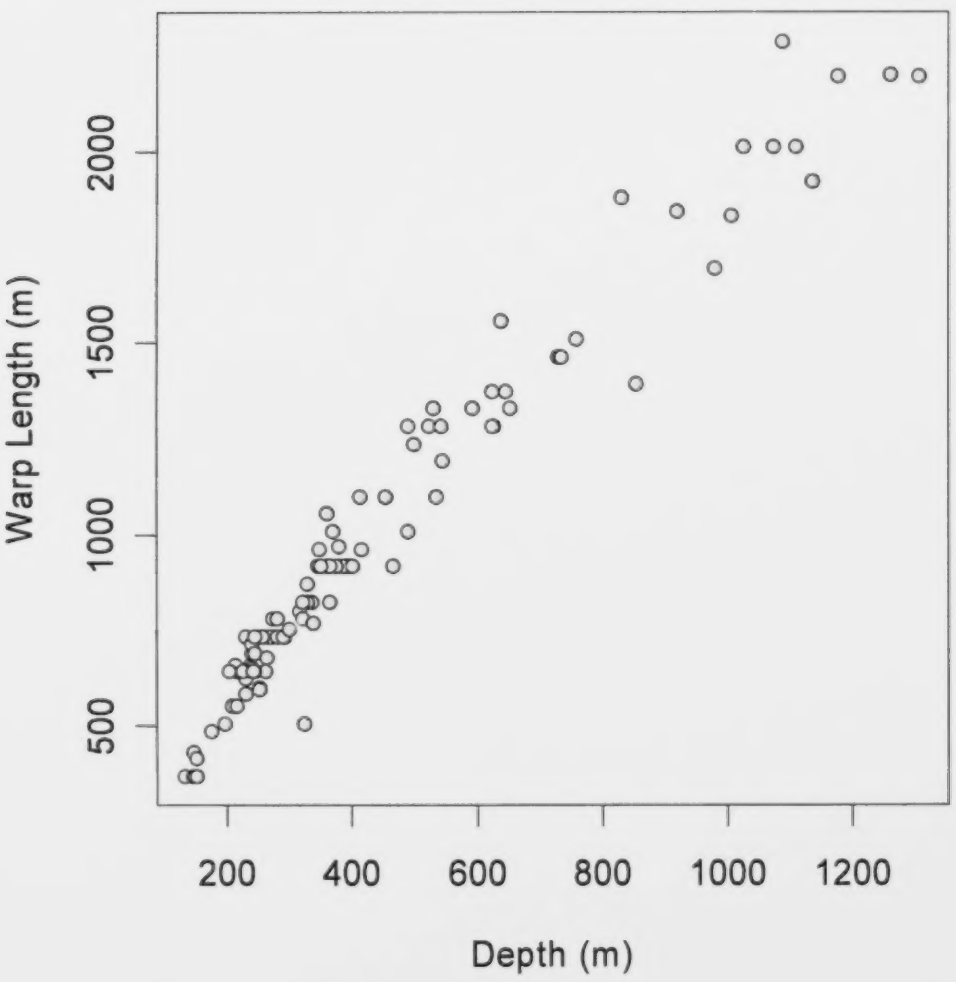

Figure 5. Warp length versus starting depth.

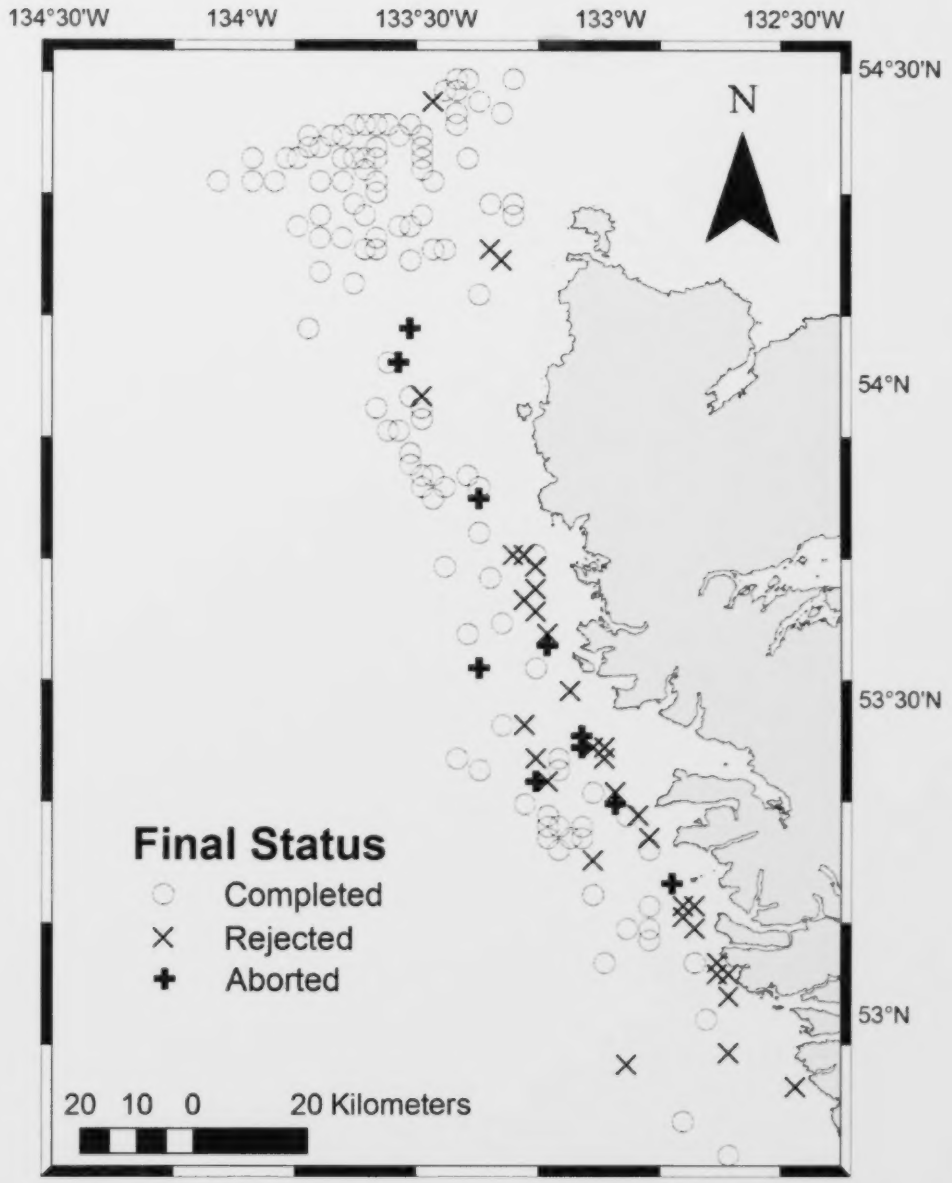

Figure 6. Final status of the sampling frame showing locations that were fished successfully (completed), rejected prior to fishing (rejected), or abandoned after one or more unsuccessful fishing attempts (aborted).

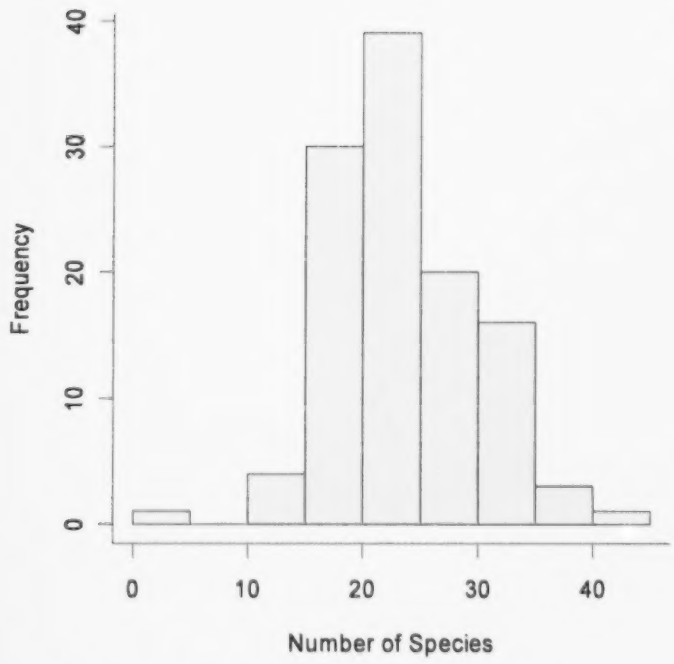

Figure 7. Histogram of number of species caught per tow.

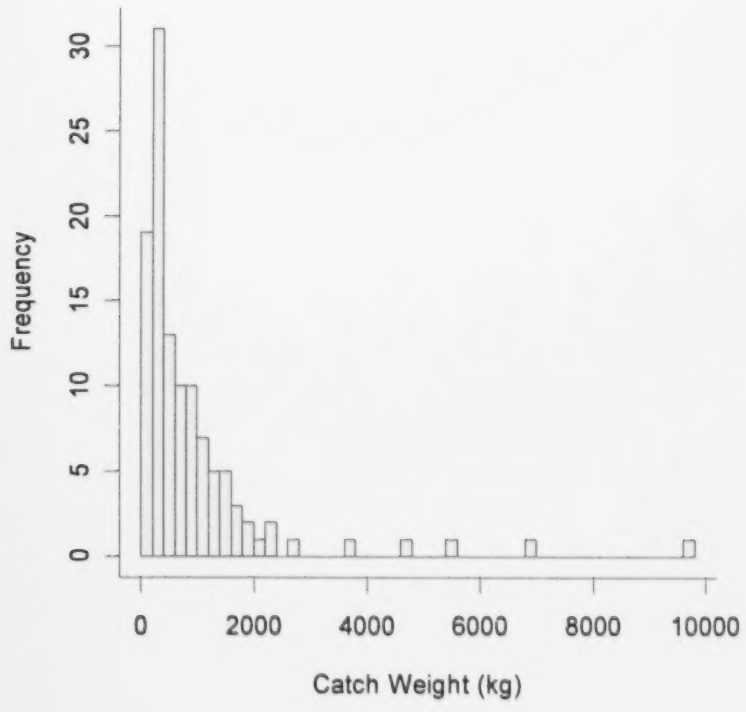

Figure 8. Histogram of catch weight per tow.

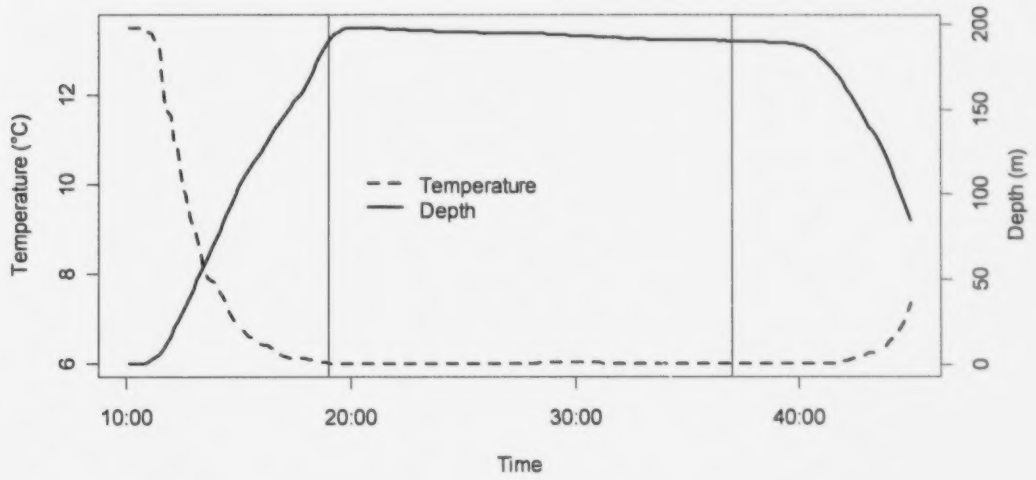

Figure 9. An example of a Seabird 39 temperature and depth profile. The vertical lines indicate the start and end of net contact with the sea floor.

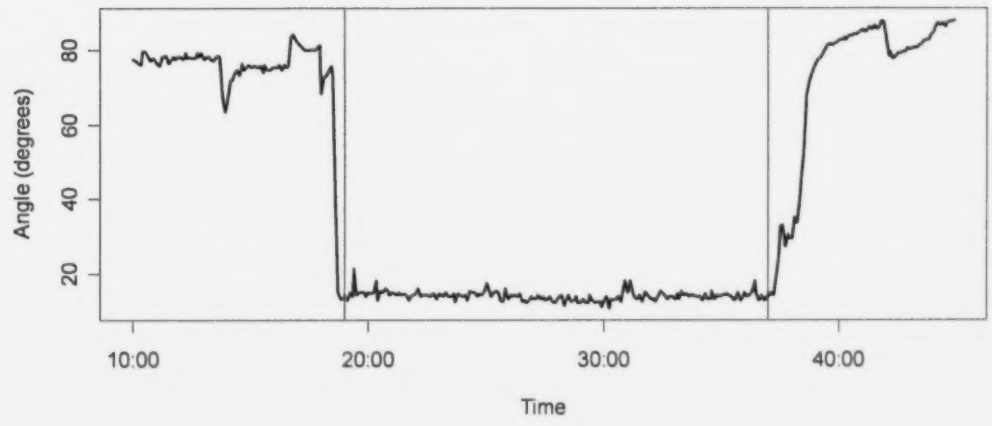

Figure 10. An example of an NMFS bottom contact sensor profile. The dashed vertical lines indicate the start and end of net contact with the sea floor. The angular readings between the start and end indicate the relative roughness of the sea floor.

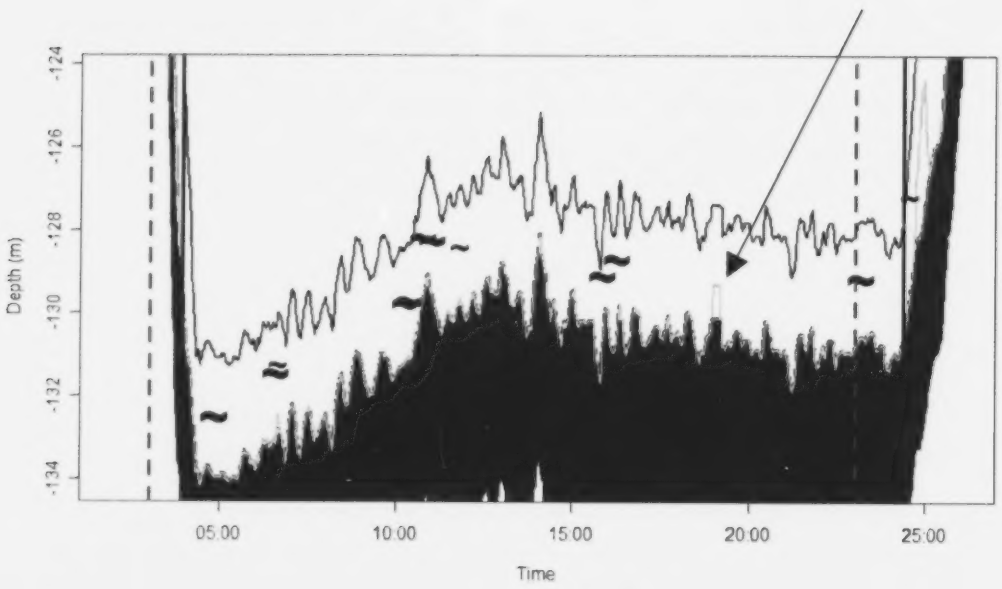

Figure 11. Example plot of net sensor data. The solid dark area at the bottom represents the sea floor. The light grey line directly above that represents the net footrope (note the region indicated by the arrow, showing where the net has risen off the sea floor for a brief period). The top line indicates the net headrope. The symbols between the headrope and the footrope indicate where fish have entered the net.

APPENDIX A: BRIDGE LOG

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
1	Aug 30	18:09	52.9883	132.6050	1027	37	-	602	281.7	Yes
2	Aug 31	07:30	53.0807	132.6527	246	20	5.6	219	1121.6	Yes
3	Aug 31	10:37	53.1927	132.7188	347	21	5.3	914	193.8	No
4	Aug 31	12:26	53.2530	132.7880	329	20	5.7	823	1029.0	No
5	Aug 31	14:55	53.3110	132.8605	204	7	-	640	230.8	No
6	Aug 31	16:13	53.3057	132.8565	225	22	-	640	194.1	Yes
7	Aug 31	17:40	53.3222	132.9168	532	24	5.6	1326	1451.6	Yes
8	Sep 01	08:11	53.4263	132.9873	209	10	5.5	549	192.3	No
9	Sep 01	10:29	53.5332	133.1137	242	18	-	640	505.1	Yes
10	Sep 01	12:09	53.5618	133.0870	146	0	-	366	13.1	No
11	Sep 02	07:25	53.7130	133.1130	150	20	5.4	366	263.4	Yes
12	Sep 02	08:46	53.7258	133.2692	231	20	5.5	583	444.7	Yes
13	Sep 02	10:39	53.8120	133.2983	152	20	5.7	412	105.8	Yes
14	Sep 02	11:51	53.7950	133.3680	282	22	5.4	777	378.8	Yes
15	Sep 02	12:59	53.7908	133.4055	376	20	5.3	914	867.5	Yes
16	Sep 02	14:44	53.7893	133.4188	415	22	5.7	960	1292.7	Yes
17	Sep 02	15:58	53.8178	133 4428	366	23	5.2	914	487.0	Yes
18	Sep 02	17:03	53.8487	133.4732	350	21	5.8	914	659.6	Yes
19	Sep 02	18:10	53.8380	133.4795	379	19	5.5	966	1024.8	Yes
20	Sep 02	19:32	53.8798	133.5072	352	21	5.7	-	1079.0	Yes
21	Sep 03	07:59	53.9487	133.4842	216	20	-	549	1319.3	Yes
22	Sep 03	09:29	53.9267	133.5723	307	22	-	-	9789.5	Yes
23	Sep 03	11:36	53.8927	133.5408	298	25	-	-	5441.4	Yes
24	Sep 03	12:55	53.9890	133.5200	200	1	-	-	0.0	No
25	Sep 03	15:30	53.9897	133.5398	231	20	-	732	-	No
26	Sep 03	17:19	53.9835	133.5340	244	19	-	594	4762.9	Yes
27	Sep 03	18:39	54.0485	133.4770	154	7	-	-	21.6	No
28	Sep 03	20:27	54.1137	133.3082	132	17	-	366	49.9	Yes
29	Sep 04	13:18	54.2633	133.2852	466	19	5.1	914	247.9	Yes
30	Sep 04	15:03	54.2470	133.2227	300	21	5.2	-	887.7	Yes
31	Sep 04	16:29	54.2633	133.2330	436	15	5.1	-	275.9	Yes
32	Sep 07	07:50	54.4487	133.2662	290	20	5.3	732	368.8	Yes
33	Sep 07	10:01	54.4680	133.3548	283	21	5.4	732	287.6	Yes
34	Sep 07	11:02	54.4550	133.3958	283	20	5.2	732	154.9	Yes
35	Sep 07	12:33	54.4355	133.4098	280	20	5.7	732	251.1	Yes
36	Sep 07	13:35	54.4205	133.4232	280	20	5.7	732	576.6	Yes
37	Sep 07	14:49	54.3973	133.4118	291	19	5.9	732	372.4	Yes
38	Sep 07	16:06	54.4037	133.3593	329	21	5.3	869	218.8	Yes
39	Sep 07	17:23	54.3875	133.3133	386	19	5.3	914	273.9	Yes
40	Sep 07	18:51	54.3288	133.3627	455	21	5.8	1097	391.3	Yes
41	Sep 07	20:10	54.2907	133.4563	360	19	5.9	914	910.0	Yes
42	Sep 08	07:22	54.3775	133.4287	252	7	5	594	81.8	No
43	Sep 08	08:14	54.3823	133.4285	257	17	5.7	732	345.8	Yes
44	Sep 08	09:39	54.3797	133.5112	239	22	5	713	388.6	Yes
45	Sep 08	10:40	54.3652	133.5443	239	16	5.5	640	315.7	Yes
46	Sep 08	11:37	54.3517	133.4962	245	20	6.9	686	1220.2	Yes

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
47	Sep 08	12:51	54.3380	133.4782	245	20	5.1	640	1430.4	Yes
48	Sep 08	14:36	54.3183	133.4988	264	20	5.9	732	1021.9	Yes
49	Sep 08	15:54	54.3050	133.4728	290	20	6.2	732	1186.0	Yes
50	Sep 08	17:35	54.3077	133.5977	262	20	5.7	640	931.7	Yes
51	Sep 08	18:45	54.3255	133.6243	251	20	5.3	732	744.7	Yes
52	Sep 08	19:53	54.3645	133.6150	217	22	6.1	640	1070.2	Yes
53	Sep 09	07:40	54.2370	133.4833	392	22	5.5	914	269.5	Yes
54	Sep 09	08:49	54.2190	133.5092	380	20	5.2	914	445.2	Yes
55	Sep 09	10:04	54.2198	133.5263	367	21	5.2	914	397.8	Yes
56	Sep 09	11:42	54.1907	133.4373	394	19	5.1	914	622.2	Yes
57	Sep 10	07:46	54.2345	133.6217	293	20	5.7	732	648.9	Yes
58	Sep 10	09:05	54.2355	133.6577	273	21	6.4	732	824.4	Yes
59	Sep 10	10:13	54.2597	133.6203	276	20	6.2	732	842.0	Yes
60	Sep 10	11:21	54.2795	133.5958	271	20	5.4	732	768.3	Yes
61	Sep 10	12:43	54.2938	133.6297	264	18	5.3	732	1412.1	Yes
62	Sep 10	13:57	54.3062	133.6653	256	18	5.1	732	2185.2	Yes
63	Sep 10	15:34	54.3182	133.6938	253	21	5.7	732	2271.5	Yes
64	Sep 10	16:51	54.3227	133.6590	255	21	5.6	732	1665.7	Yes
65	Sep 10	18:11	54.3650	133.6327	214	22	5.9	658	760.8	Yes
66	Sep 10	19:10	54.3550	133.6967	237	21	5.5	640	759.1	Yes
67	Sep 10	20:10	54.3400	133.7300	240	21	5.7	640	327.1	Yes
68	Sep 10	22:09	54.3183	133.8567	523	41	5.4	1280	482.5	Yes
69	Sep 11	07:45	54.3302	133.7955	231	20	5.4	622	2268.0	Yes
70	Sep 11	08:52	54.3367	133.7983	237	16	6	658	3628.8	Yes
71	Sep 11	10:36	54.2768	133.7528	240	21	5.3	686	1817.0	Yes
72	Sep 11	11:48	54.2695	133.7062	253	20	5.9	596	1216.4	Yes
73	Sep 11	13:14	54.2265	133.7428	240	19	4.9	647	1702.4	Yes
74	Sep 11	14:17	54.1910	133.7613	270	19	5.6	732	6804.0	Yes
75	Sep 11	15:42	54.1767	133.6883	260	21	5.4	732	1303.2	Yes
76	Sep 13	09:14	54.3628	133.5920	233	20	6.1	640	728.7	Yes
77	Sep 13	10:28	54.3593	133.6693	223	23	5.9	640	1537.7	Yes
78	Sep 13	11:45	54.3183	133.7533	240	20	5.7	640	706.1	Yes
79	Sep 13	12:53	54.3023	133.8263	394	13	5.6	914	398.6	No
80	Sep 13	13:58	54.3017	133.8208	366	20	5.2	823	717.1	Yes
81	Sep 13	16:16	54.2660	133.8762	628	42	5.2	1280	256.2	Yes
82	Sep 13	18:38	54.1840	133.6098	325	21	5.4	503	508.1	Yes
83	Sep 14	10:35	53.6472	133.2153	490	21	5.4	1280	451.8	Yes
84	Sep 14	12:32	53.7800	133.2862	175	1	5	485	-	No
85	Sep 14	13:59	53.8163	133.3028	147	20	5.9	430	124.1	Yes
86	Sep 14	15:02	53.8117	133.3908	283	17	5.3	732	334.7	Yes
87	Sep 14	17:34	53.9157	133.4567	198	20	5.2	503	988.6	Yes
88	Sep 14	18:30	53.9150	133.4533	197	20	5.6	503	822.8	Yes
89	Sep 14	21:45	54.0287	133.7545	1008	40	4.8	1829	280.3	Yes
90	Sep 15	08:38	54.2855	133.9477	856	37	4.5	1390	266.2	Yes
91	Sep 15	10:19	54.2762	133.9600	981	40	4.4	1692	263.3	Yes
92	Sep 15	12:45	54.2788	134.0255	1138	40	4.4	1920	171.5	Yes
93	Sep 15	15:02	54.2058	133.8212	536	33	5.5	1097	927.4	Yes
94	Sep 15	17:53	54.1105	133.7343	626	43	5.6	1280	334.9	Yes

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
95	Sep 15	19:02	54.1627	133.6350	316	16	5.9	796	586.9	Yes
96	Sep 15	20:05	54.1793	133.5957	337	20	6	823	532.2	Yes
97	Sep 16	07:40	53.6503	133.3537	594	38	5.6	1326	224.8	Yes
98	Sep 16	09:35	53.5845	133.3093	501	26	5.4	1234	262.3	Yes
99	Sep 16	11:44	53.5293	133.2605	542	6	5	1280	55.4	No
100	Sep 16	15:45	53.3955	133.0270	646	32	4.8	1372	197.8	Yes
101	Sep 16	17:34	53.3630	133.0187	736	40	5.4	1463	135.0	Yes
102	Sep 16	18:55	53.4040	132.9630	211	4	5	549	118.5	No
103	Sep 17	14:19	54.1178	133.6645	321	13	5.9	823	1367.0	No
104	Sep 17	15:21	54.1213	133.6607	323	15	5.8	777	1425.9	Yes
105	Sep 17	16:51	54.1472	133.5205	370	22	5.9	1006	478.9	Yes
106	Sep 17	17:59	54.1743	133.4250	401	19	6.1	914	338.6	Yes
107	Sep 19	10:44	53.5910	133.1932	640	46	5.2	1555	598.5	Yes
108	Sep 19	14:21	53.4370	133.1867	546	28	4.8	1189	399.5	Yes
109	Sep 19	16:20	53.3452	133.0993	214	5	5	549	72.6	No
110	Sep 19	17:56	53.3072	133.1018	414	25	4.7	1097	328.6	Yes
111	Sep 20	06:58	53.2663	133.0742	624	41	5.2	1372	145.5	Yes
112	Sep 20	08:43	53.2623	132.9840	360	25	4.9	1052	1178.0	Yes
113	Sep 20	12:17	53.3705	133.2350	1075	46	4.2	2012	170.1	Yes
114	Sep 20	14:27	53.3635	133.2830	1090	61	4.4	2286	199.4	Yes
115	Sep 20	17:37	53.2662	132.9942	349	25	5.5	960	817.7	Yes
116	Sep 20	18:42	53.2888	133.0375	273	23	5.1	777	1753.1	Yes
117	Sep 20	20:19	53.2688	133.0410	490	22	5.1	1006	281.1	Yes
118	Sep 20	22:23	53.2360	132.9970	655	42	5.2	1326	115.4	Yes
119	Sep 21	06:34	53.1812	132.9203	759	40	5	1509	134.8	Yes
120	Sep 21	08:32	53.2192	132.9198	626	28	4.9	1372	82.2	Yes
121	Sep 21	10:03	53.2572	132.9497	263	9	5.2	677	639.4	No
122	Sep 21	11:15	53.2662	132.9795	338	21	5.3	768	2721.6	Yes
123	Sep 21	12:54	53.2813	132.9802	300	23	5.5	750	1814.4	Yes
124	Sep 21	15:15	53.1705	132.7767	731	41	4.8	1463	96.9	Yes
125	Sep 21	17:09	53.1107	132.7612	920	49	4.7	1842	140.5	Yes
126	Sep 21	18:50	53.1045	132.7455	831	49	4	1876	194.7	Yes
127	Sep 21	20:45	53.1235	132.8163	1110	49	4.3	2012	459.1	Yes
128	Sep 21	22:47	53.0713	132.8725	1179	47	4.4	2195	251.1	Yes
129	Sep 22	10:17	52.8268	132.6380	1263	42	4.5	2198	158.4	Yes
130	Sep 22	13:15	52.7727	132.5370	1308	40	4.4	2195	100.6	Yes

APPENDIX B: CATCH BY TOW

Species	1	2	3	4	5	6	7	8	9	10
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	-	37.54	6.54	7.44	5.04	4.28	110.86	14.18	43.88	-
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	0.40	-	-	-	-	-	0.24	-	-
Bocaccio	-	10.82	-	13.12	-	5.70	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	1.54	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	1.14	-	-	-	-	-	-	-	-	-
Dover sole	-	2.40	1.32	1.38	-	0.16	48.40	-	1.52	-
English sole	-	-	-	0.56	-	0.36	-	-	0.50	-
Giant grenadier	27.28	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	1.58	1.30	-
Harlequin rockfish	-	-	0.10	-	-	-	-	0.62	-	-
Lingcod	-	2.64	-	-	5.12	-	-	11.72	4.24	-
Longnose skate	-	-	-	-	-	8.00	-	4.54	-	-
Longspine thornyhead	18.80	-	-	-	-	-	-	-	-	-
Pacific cod	-	-	-	-	-	17.50	-	3.68	7.14	-
Pacific flatnose	3.04	-	-	-	-	-	1.71	-	-	-
Pacific grenadier	155.81	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	3.50	33.48	-	-	20.30	-	-	-
Pacific halibut	-	7.04	-	7.96	-	-	-	-	-	-
Pacific ocean perch	-	783.97	24.68	699.80	6.18	26.24	-	26.22	277.22	0.86
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	10.78	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	18.44	5.44	6.38	-	2.84	-	11.74	2.26	-
Redstripe rockfish	-	-	0.60	1.52	58.90	6.36	-	2.76	-	7.35
Rex sole	-	1.30	0.24	0.68	-	-	3.24	1.98	4.64	-
Rosethorn rockfish	-	-	0.60	1.29	0.58	9.30	-	2.66	2.50	-
Rougheye rockfish	-	-	1.04	13.68	-	-	127.26	-	-	-
Roughtail skate	1.36	0.64	-	-	-	-	-	-	-	-
Sablefish	53.58	42.80	-	-	-	-	1079.82	-	-	-
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	-	6.62	-	2.38	88.90	26.90	-	25.68	40.45	-
Shortraker rockfish	-	6.22	137.72	163.42	-	-	-	-	-	-
Shortspine thornyhead	3.64	51.02	9.90	42.30	0.07	57.00	59.36	16.21	30.06	-
Silvergray rockfish	-	108.57	-	13.60	55.74	22.42	-	47.71	68.24	4.91
Slender sole	-	2.05	-	0.03	0.08	0.10	-	-	1.90	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	1.46	-	-	-	-	0.26	-
Spotted ratfish	-	9.20	-	0.96	-	1.08	-	0.90	3.14	-
Twoline eelpout	0.18	-	-	-	-	-	-	-	-	-
Walleye pollock	-	4.44	-	-	-	5.79	-	2.34	10.90	-
Widow rockfish	-	24.82	-	6.14	1.94	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	8.10	-	-	0.96	-	-
Yellowtail rockfish	-	-	-	1.44	-	-	-	-	4.14	-
Other	6.05	0.69	2.14	8.44	0.10	0.10	0.61	16.53	0.85	-
Total	281.66	1121.62	193.82	1029.02	230.75	194.13	1451.56	192.25	505.14	13.12

Species	11	12	13	14	15	16	17	18	19	20
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	211.46	30.30	30.84	20.96	70.16	60.96	68.64	49.76	67.48	25.40
Aurora rockfish	-	-	-	0.64	-	1.66	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	0.16	-	-	0.24	-	-	5.38	-	-
Bocaccio	-	3.20	-	-	-	-	-	-	-	-
Cabezon	-	8.16	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	0.98	-	2.00
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	1.54	3.04	-	4.36	2.78	32.74	2.90	2.88	21.32	15.58
English sole	0.58	-	8.97	7.62	0.36	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	7.98	-	0.64	-	-	-	-	-	-
Harlequin rockfish	-	0.36	-	0.22	-	-	-	-	-	-
Lingcod	-	-	11.56	6.96	4.34	-	-	-	-	-
Longnose skate	4.34	11.90	-	-	3.36	1.08	-	5.38	7.82	-
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	3.72	2.90	1.80	-	-	-	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	434.66	104.38	205.78	283.86	175.12	272.80
Pacific halibut	18.00	-	17.00	-	-	-	-	-	-	-
Pacific ocean perch	-	14.04	-	162.38	104.08	2.60	85.28	192.72	46.42	459.76
Petrale sole	19.06	-	6.16	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	2.26	-	30.76	7.20	6.26	8.08	5.68	14.58	5.44
Redstripe rockfish	-	132.74	-	-	-	-	-	-	-	-
Rex sole	1.82	8.54	21.62	5.20	2.44	1.84	1.48	4.78	3.34	5.08
Rosethorn rockfish	-	13.12	-	0.52	1.06	-	0.78	2.40	-	2.20
Rougheye rockfish	-	-	-	-	171.50	1037.43	51.38	9.58	643.50	217.24
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	-	-	-	13.02	2.96	18.38	10.80	5.92	6.50
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	-	9.44	-	14.66	-	-	-	-	-	0.44
Shortraker rockfish	-	-	-	-	-	-	-	-	19.30	4.34
Shortspine thornyhead	-	6.04	-	19.88	28.96	35.08	38.32	67.46	17.10	43.52
Silvergray rockfish	-	175.22	-	50.30	4.50	-	-	-	-	2.00
Slender sole	0.80	1.50	0.14	2.30	0.01	0.66	0.50	-	0.20	0.52
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	2.16	2.16	5.20	-	-	-	-	-	-	-
Splitnose rockfish	-	0.20	-	29.04	0.34	-	-	-	0.82	1.14
Spotted ratfish	2.34	2.20	0.73	0.26	-	-	-	-	-	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	0.30	7.54	0.68	9.50	3.92	3.20	4.26	4.70	0.78	3.20
Widow rockfish	-	-	-	-	2.08	-	-	-	-	-
Yellowmouth rockfish	-	-	-	1.82	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	1.00	0.90	-	8.98	12.49	1.88	1.26	13.22	1.06	11.80
Total	263.40	444.72	105.80	378.80	867.50	1292.73	487.04	659.58	1024.76	1078.96

Species	21	22	23	24	25	26	27	28	29	30
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	29.32	224.56	22.85	-	-	12.12	-	-	43.58	407.70
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	7.78	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	1.00	-	-	-	-	-	0.10	-
Bocaccio	10.06	-	4.19	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	3.68	-	-	-	-	57.94	-	-	-	-
Darkblotched rockfish	-	14.96	208.21	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	0.56	0.55	2.90	-	-	0.46	-	-	24.20	3.16
English sole	3.08	-	-	-	-	1.08	-	-	-	3.36
Giant grenadier	-	-	-	-	-	-	-	-	2.12	-
Greenstriped rockfish	29.64	-	-	-	-	4.32	-	-	-	-
Harlequin rockfish	0.26	-	-	-	-	2.10	0.10	-	-	0.62
Lingcod	13.58	-	-	-	-	19.18	-	-	-	12.30
Longnose skate	-	22.86	-	-	-	13.94	-	-	6.10	-
Longspine thornyhead	-	-	-	-	-	-	-	-	9.62	0.30
Pacific cod	13.96	-	-	-	-	43.60	-	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	-	-	-	-	64.09	1.00
Pacific halibut	-	-	-	-	-	-	-	17.90	-	-
Pacific ocean perch	1.24	8164.70	3900.90	-	-	4.46	-	-	-	315.88
Petrale sole	-	-	-	-	-	0.78	-	9.08	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	2.10	-	-	-	7.72	-	-	-	8.68
Redstripe rockfish	-	-	-	-	-	59.28	-	-	-	-
Rex sole	14.92	0.26	3.42	-	-	2.86	-	-	7.50	16.42
Rosethorn rockfish	1.14	7.62	17.90	-	-	16.06	-	-	-	0.28
Rougheye rockfish	-	1283.69	564.82	-	-	-	-	-	18.79	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	17.92	-	-	-	-	-	-	7.30	-
Sandpaper skate	-	-	-	-	-	-	-	-	3.15	-
Sharpchin rockfish	2.10	8.12	19.64	-	-	194.78	1.00	-	-	0.88
Shortraker rockfish	-	-	655.52	-	-	-	-	-	-	12.08
Shortspine thornyhead	-	5.44	15.42	-	-	0.24	-	-	57.20	68.02
Silvergray rockfish	1175.90	12.12	4.20	-	-	4040.00	14.08	-	-	5.88
Slender sole	0.20	-	-	-	-	0.62	-	-	-	0.62
Southern rock sole	-	-	-	-	-	-	-	22.90	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	-	3.10
Spotted ratfish	0.28	4.38	-	-	-	12.94	-	-	1.19	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	6.46	-	-	-	-	0.92	-	-	-	27.10
Widow rockfish	10.22	-	-	-	-	254.02	-	-	-	-
Yellowmouth rockfish	-	10.54	18.90	-	-	2.64	-	-	-	-
Yellowtail rockfish	1.60	-	-	-	-	2.80	-	-	-	-
Other	1.05	1.90	1.50	-	-	8.06	6.46	-	2.92	0.32
Total	1319.25	9789.50	5441.37	-	-	4762.92	21.64	49.88	247.86	887.70

Species	31	32	33	34	35	36	37	38	39	40
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	46.42	22.22	11.19	18.14	34.00	39.42	29.90	35.85	22.71	25.21
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	0.54	1.09	0.31	-	-	0.50	-	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	0.66	2.02	-	9.58	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	25.30	30.56	18.00	4.30	5.44	20.10	2.36	47.20	46.08	56.28
English sole	-	-	-	-	0.90	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	0.20	-	-	-	-	-	-	-	-
Lingcod	-	-	-	5.80	-	3.70	-	-	-	-
Longnose skate	20.00	-	17.22	8.66	26.24	15.80	-	11.89	12.71	32.31
Longspine thornyhead	-	-	-	-	-	-	-	-	-	9.60
Pacific cod	-	-	-	6.10	-	-	0.53	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	8.78	38.90	82.11	11.74	-	-	1.40	38.08	83.71	80.83
Pacific halibut	-	-	-	-	3.42	-	-	-	8.08	-
Pacific ocean perch	8.30	82.81	90.88	16.53	69.38	369.53	275.48	7.94	-	1.12
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	10.86	2.38	-	0.58	3.46	-	7.90	1.87	-
Redstripe rockfish	-	-	-	-	-	-	-	-	-	-
Rex sole	25.30	16.68	4.00	55.62	72.56	45.56	8.87	19.84	30.40	25.04
Rosethorn rockfish	-	1.36	-	-	-	0.48	0.90	-	-	-
Rougheye rockfish	35.50	16.51	6.75	0.70	-	1.15	2.78	-	6.01	23.64
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	11.80	12.47	2.49	5.02	5.28	6.50	1.95	6.30	16.48	15.38
Sandpaper skate	-	-	-	-	-	-	-	-	-	2.00
Sharpchin rockfish	-	0.60	0.15	0.25	0.64	0.30	0.74	-	-	-
Shortraker rockfish	-	33.62	-	-	-	-	-	-	-	7.00
Shortspine thornyhead	87.24	62.08	49.92	7.67	7.00	18.66	33.40	17.34	36.99	103.22
Silvergray rockfish	-	-	-	4.45	20.48	44.24	11.56	-	-	-
Slender sole	-	-	-	-	1.08	-	-	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	0.50	-	-
Spotted ratfish	1.36	-	-	1.65	0.15	-	-	1.80	1.55	6.10
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	1.30	0.50	1.04	6.01	2.10	0.72	-	11.60	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	1.90	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	4.60	38.92	0.40	1.98	1.14	2.88	2.02	2.98	7.27	3.52
Total	275.90	368.83	287.62	154.93	251.05	576.62	372.39	218.80	273.86	391.25

Species	41	42	43	44	45	46	47	48	49	50
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	15.26	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	13.76	1.32	11.00	5.17	8.55	3.66	1.22	8.56	16.40	5.46
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.40	0.16	0.98	0.18	0.29	0.52	-	0.30	1.12	0.36
Bocaccio	-	-	-	-	-	-	-	-	-	5.16
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	24.90	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	7.50	0.32	0.20	4.75	-	-	0.36	2.97	3.20	3.74
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	0.27	-	-	-	-	-	-	-	-
Lingcod	-	-	-	-	-	-	-	-	-	-
Longnose skate	31.60	-	-	-	-	-	-	-	12.14	-
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	-	7.40	13.58	7.21	4.88	1.56	14.00	0.90	1.70
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	47.62	-	0.80	-	0.67	-	-	-	-	-
Pacific halibut	-	-	-	-	-	-	-	3.91	-	-
Pacific ocean perch	554.42	41.85	165.62	236.72	169.86	835.90	952.55	779.36	778.81	777.45
Petrale sole	-	-	-	-	0.89	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	8.84	-	2.17	2.14	20.40	3.74	7.65	8.14	6.10	5.84
Redstripe rockfish	-	1.39	10.43	0.70	0.49	131.66	12.82	-	-	-
Rex sole	3.14	1.26	2.19	28.94	2.97	1.80	1.92	5.87	3.96	9.70
Rosethorn rockfish	7.48	2.20	13.46	0.32	5.83	3.62	5.08	10.46	21.50	18.66
Rougheye rockfish	57.61	-	0.21	-	-	-	-	-	2.30	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	17.04	-	3.97	2.96	-	-	-	-	6.32	2.60
Sandpaper skate	2.68	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	0.20	13.04	56.57	18.72	43.81	38.62	123.36	110.50	6.80	47.84
Shortraker rockfish	13.46	-	-	-	-	-	-	-	13.87	-
Shortspine thornyhead	109.16	6.84	36.41	8.26	9.22	13.00	15.38	22.81	113.87	28.86
Silvergray rockfish	-	5.38	10.37	54.69	38.00	30.50	30.18	14.58	13.48	18.90
Slender sole	-	-	-	0.36	-	-	-	-	-	0.46
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	0.32	-
Spotted ratfish	-	-	1.18	-	-	-	-	0.67	-	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	1.00	0.27	0.80	2.01	1.86	0.90	0.80	-	-	0.70
Widow rockfish	-	-	-	2.54	2.30	-	-	-	4.22	-
Yellowmouth rockfish	-	6.38	5.90	4.35	2.48	150.42	269.73	38.64	180.12	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	9.20	1.09	0.92	2.19	0.58	0.98	7.77	1.11	0.60	4.24
Total	910.01	81.77	345.84	388.58	315.71	1220.20	1430.38	1021.88	1186.03	931.67

Species	51	52	53	54	55	56	57	58	59	60
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	5.55	22.38	17.26	19.80	16.40	10.76	18.14	14.74	19.44	4.40
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.54	0.14	-	-	-	-	0.14	1.10	0.58	0.38
Bocaccio	-	-	-	-	-	-	-	-	-	4.06
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	0.72	0.32	14.60	0.92	3.02	12.66	3.56	2.68	1.48	1.24
English sole	0.56	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	0.20	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	0.12	-	-	-	-	-	-	-
Lingcod	-	-	-	-	-	-	-	-	-	-
Longnose skate	-	-	15.17	2.70	3.48	-	-	-	-	-
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	1.44	-	-	-	-	-	3.32	7.50	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	0.83	-	101.00	215.09	139.00	298.18	4.68	0.92	-	-
Pacific halibut	-	6.46	-	-	-	6.10	-	3.31	-	-
Pacific ocean perch	604.04	641.26	9.58	83.90	87.41	17.62	563.39	683.86	748.10	704.69
Petrale sole	-	-	-	-	-	-	-	0.62	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	1.62	2.60	2.22	1.72	2.34	-	3.08	2.38	2.40	0.68
Redstripe rockfish	12.36	187.10	1.04	-	-	-	-	-	-	0.66
Rex sole	5.64	1.30	3.44	0.41	1.64	5.22	4.16	2.10	3.52	5.08
Rosethorn rockfish	6.68	0.20	-	-	-	-	3.42	11.02	12.80	10.60
Rougheye rockfish	-	-	28.88	52.00	106.50	159.41	-	-	0.26	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	5.22	37.35	28.48	9.96	46.38	2.14	-	-	-
Sandpaper skate	-	-	0.48	-	-	-	-	-	-	-
Sharpchin rockfish	65.43	1.60	-	0.30	0.56	-	0.22	64.88	1.06	1.74
Shortraker rockfish	-	-	-	-	-	-	-	-	-	-
Shortspine thornyhead	10.34	-	35.10	32.82	20.90	55.29	23.94	24.16	31.54	16.30
Silvergray rockfish	23.19	184.68	-	-	-	-	19.10	4.60	1.64	15.12
Slender sole	0.24	0.12	-	-	-	-	-	-	0.28	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	0.56	0.48	0.58	0.18
Spotted ratfish	-	5.80	1.18	3.08	2.93	4.88	-	-	1.44	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	1.53	1.26	-	-	0.96	2.40	0.54	0.50	0.56	0.86
Widow rockfish	-	1.70	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	6.30	-	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	5.38	0.14	2.06	3.96	2.66	3.32	1.86	3.69	8.80	2.30
Total	744.65	1070.22	269.48	445.18	397.76	622.22	648.93	824.36	841.98	768.29

Species	61	62	63	64	65	66	67	68	69	70
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	7.70	11.20	12.36	20.23	21.02	18.12	8.92	23.82	2.00	-
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.31	-	0.18	-	-	0.20	0.03	-	0.65	0.57
Bocaccio	-	-	-	-	-	-	-	-	-	5.00
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	-	-	0.96	1.27	0.84	2.37	0.92	10.90	2.92	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	1.77	0.11	-	-	-	-
Harlequin rockfish	-	0.10	-	0.15	0.14	0.51	-	-	3.47	-
Lingcod	-	-	-	-	-	-	-	-	7.46	31.44
Longnose skate	-	-	-	-	-	-	15.71	15.52	-	13.66
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	6.30	-	2.20	1.99	12.76	6.32	20.58	-	-	2.44
Pacific flatnose	-	-	-	-	-	-	-	0.46	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	-	-	-	177.66	1.00	-
Pacific halibut	-	-	-	-	16.00	4.53	9.75	-	3.25	21.12
Pacific ocean perch	1305.57	2018.88	1927.32	1438.58	608.96	620.07	177.02	-	1971.74	3217.92
Petrale sole	-	-	-	-	-	3.32	3.66	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	3.14	5.08	5.40	8.10	0.08	1.32	1.80	-	1.14	1.91
Redstripe rockfish	-	-	82.62	-	5.30	6.17	10.25	-	-	-
Rex sole	5.00	6.82	5.62	8.23	2.55	10.52	9.08	54.69	0.50	-
Rosethorn rockfish	8.26	8.36	14.90	8.68	0.38	1.98	7.90	-	-	0.20
Rougheye rockfish	-	-	-	-	-	-	-	5.64	2.00	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	1.76	6.96	10.56	-	13.50	-	-	27.64	-	11.60
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	55.02	83.52	167.36	129.64	5.62	26.36	47.11	-	199.28	177.55
Shortraker rockfish	-	-	-	-	-	-	-	16.36	-	-
Shortspine thornyhead	14.54	7.40	8.92	13.30	-	1.77	5.33	147.76	10.61	45.82
Silvergray rockfish	2.30	22.54	25.96	27.48	62.72	33.88	5.98	-	58.48	34.17
Slender sole	0.30	-	-	0.38	0.10	0.13	0.06	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	8.06	-	-	-	-
Splitnose rockfish	0.40	-	-	0.58	-	-	0.05	-	-	-
Spotted ratfish	0.90	-	3.50	-	3.88	4.80	1.50	-	-	33.41
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	-	0.60	0.26	0.60	3.23	0.86	1.48	-	2.00	3.00
Widow rockfish	-	-	1.90	-	-	-	-	-	1.50	11.89
Yellowmouth rockfish	-	-	0.70	-	1.93	3.03	-	-	-	1.62
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	0.62	13.69	0.73	6.52	-	4.71	0.01	2.02	-	-
Total	1412.12	2185.15	2271.45	1665.73	760.78	759.14	327.14	482.47	2268.00	3628.78

Species	71	72	73	74	75	76	77	78	79	80
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	11.87	14.72	3.64	4.50	7.80	15.82	27.44	8.61	21.24	22.93
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	1.92	0.48	0.44	-	0.52	0.32	-	0.88	1.38	1.11
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	4.02	0.60	0.50	-	0.34	2.66	2.48	0.95	4.90	1.25
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	0.44	0.68	-	-	-
Harlequin rockfish	2.01	0.84	2.62	4.71	0.48	0.80	1.26	1.25	-	-
Lingcod	5.20	6.96	11.70	10.30	20.16	-	5.16	19.98	-	-
Longnose skate	-	-	-	9.30	-	-	-	12.40	-	11.14
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	13.64	3.03	16.16	-	2.32	6.60	-	16.55	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	-	-	-	-	6.14	11.73
Pacific halibut	26.29	-	-	1.82	12.30	5.86	3.95	12.58	-	-
Pacific ocean perch	765.24	1026.97	528.14	6133.75	888.84	464.62	742.14	158.19	15.48	122.33
Petrale sole	2.90	-	-	-	1.46	-	0.77	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	77.05	6.10	32.32	-	0.36	10.76	3.34	4.02	-	-
Redstripe rockfish	24.19	-	1.30	-	1.42	-	53.11	-	-	-
Rex sole	12.87	4.42	2.30	-	1.68	2.62	4.38	11.03	1.54	0.84
Rosethorn rockfish	24.65	16.99	11.20	-	5.16	3.42	1.96	24.92	-	2.53
Rougheye rockfish	-	-	-	-	-	-	-	-	297.70	451.68
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	2.52	5.40	11.96	-	3.40	-	-	12.20	24.83
Sandpaper skate	-	-	-	-	-	-	-	-	-	1.08
Sharpchin rockfish	718.77	93.53	902.75	426.08	306.20	165.56	521.71	343.74	-	-
Shortraker rockfish	-	-	-	-	-	-	-	-	-	10.41
Shortspine thornyhead	10.04	17.78	3.18	5.97	3.02	12.48	2.19	9.60	37.98	55.02
Silvergray rockfish	95.86	11.66	179.47	184.00	49.20	23.56	61.08	67.50	-	-
Slender sole	-	0.26	0.22	-	-	0.12	-	0.56	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	2.70	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	0.40	-	-	-	-	-	-	-	-
Spotted ratfish	6.39	6.31	-	1.80	1.50	5.10	2.52	10.31	-	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	4.56	1.76	0.64	2.20	-	2.15	0.88	1.08	-	-
Widow rockfish	-	-	-	2.00	-	-	-	-	-	-
Yellowmouth rockfish	2.60	-	-	-	-	1.84	96.52	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	4.24	1.08	0.42	5.62	0.48	0.59	6.11	1.98	-	0.20
Total	1817.01	1216.41	1702.40	6804.01	1303.24	728.72	1537.68	706.13	398.56	717.08

Species	81	82	83	84	85	86	87	88	89	90
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	8.30	-	-	-	-	-	-	17.15
Arrowtooth flounder	5.24	31.72	59.64	-	8.78	13.92	98.42	112.52	-	-
Aurora rockfish	-	-	2.16	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	-	-	-	-	-	-	-	0.04
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	252.50	237.32	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	0.56	-	-	-	-	-	-	-	0.02	2.28
Dover sole	25.18	18.74	35.24	-	-	2.84	-	-	-	3.98
English sole	-	-	-	-	-	6.86	1.65	1.56	-	-
Giant grenadier	69.12	-	-	-	-	-	-	-	26.40	29.64
Greenstriped rockfish	-	-	-	-	0.22	1.08	11.12	9.94	-	-
Harlequin rockfish	-	-	-	-	0.36	0.77	-	-	-	-
Lingcod	-	-	-	-	37.82	7.10	3.42	3.66	-	-
Longnose skate	-	-	-	-	-	-	15.54	-	-	-
Longspine thornyhead	6.12	-	0.20	-	-	-	-	-	35.88	40.84
Pacific cod	-	2.14	-	-	-	-	25.30	12.20	-	-
Pacific flatnose	5.24	-	0.36	-	-	-	-	-	1.44	1.06
Pacific grenadier	0.56	-	-	-	-	-	-	-	19.90	1.62
Pacific hake	2.84	18.00	9.28	-	-	0.70	-	-	-	-
Pacific halibut	-	-	-	-	11.50	-	2.60	8.58	-	-
Pacific ocean perch	2.10	357.91	-	-	-	149.93	-	-	-	-
Petrale sole	-	-	-	-	41.90	-	27.08	50.40	-	-
Popeye	4.02	-	-	-	-	-	-	-	11.62	32.70
Redbanded rockfish	-	2.92	-	-	-	20.36	2.80	-	-	-
Redstripe rockfish	-	-	-	-	-	-	-	13.30	-	-
Rex sole	13.04	5.87	3.36	-	5.50	6.44	51.90	52.80	-	-
Rosethorn rockfish	-	3.55	-	-	-	8.14	-	-	-	-
Rougheye rockfish	4.58	0.08	94.60	-	-	0.55	-	-	1.56	-
Roughtail skate	-	-	-	-	-	-	-	-	-	1.94
Sablefish	33.68	3.48	111.28	-	-	-	-	-	157.68	97.70
Sandpaper skate	-	-	1.10	-	-	-	-	-	-	-
Sharpchin rockfish	-	0.70	-	-	0.22	21.80	-	0.10	-	-
Shortraker rockfish	-	-	57.03	-	-	-	-	-	-	-
Shortspine thornyhead	77.12	45.20	65.66	-	0.70	21.98	-	-	16.60	35.94
Silvergray rockfish	-	6.88	-	-	-	44.22	483.74	300.07	-	-
Slender sole	-	0.26	-	-	-	0.80	0.58	1.08	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	5.72	-	-	11.90	3.28	4.24	14.16	-	-
Splitnose rockfish	-	1.10	-	-	-	4.38	-	-	-	-
Spotted ratfish	-	-	-	-	4.50	0.20	0.72	2.68	-	-
Twoline eelpout	2.04	-	-	-	-	-	-	-	-	0.16
Walleye pollock	-	0.44	-	-	-	3.02	1.24	2.40	-	-
Widow rockfish	-	-	-	-	-	-	5.74	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	4.80	3.35	3.54	-	0.70	16.32	-	-	9.21	1.16
Total	256.24	508.06	451.75	-	124.10	334.69	988.59	822.77	280.31	266.21

Species	91	92	93	94	95	96	97	98	99	100
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	14.88	-	-	5.68	-	-	-
Arrowtooth flounder	-	-	12.56	0.68	20.56	20.62	20.04	10.33	3.48	15.03
Aurora rockfish	-	-	-	-	-	-	-	5.90	1.34	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	-	-	0.40	0.94	0.05	-	-	-
Bocaccio	-	-	-	-	6.80	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	2.78	-	-	-	-
Deepsea sole	0.92	-	-	1.94	-	-	0.79	-	-	1.00
Dover sole	8.14	-	53.64	72.14	0.20	38.94	54.42	7.96	-	23.50
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	21.02	28.14	-	28.50	-	-	1.31	-	-	13.95
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	-	-	0.92	-	-	-	-	-
Lingcod	-	-	-	-	7.66	-	-	-	-	-
Longnose skate	-	-	-	2.12	-	-	-	-	-	-
Longspine thornyhead	36.16	27.89	1.25	33.66	-	-	26.88	17.04	4.67	17.88
Pacific cod	-	-	-	-	5.12	-	-	-	-	-
Pacific flatnose	1.38	1.35	-	1.86	-	-	2.13	1.16	0.50	0.78
Pacific grenadier	5.96	25.03	-	-	-	-	0.15	-	-	1.38
Pacific hake	-	-	35.88	20.04	1.12	185.70	6.21	11.00	1.97	-
Pacific halibut	-	-	3.81	-	-	-	-	-	-	-
Pacific ocean perch	-	-	-	-	455.56	176.56	-	-	-	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	61.70	28.64	-	4.98	-	-	-	-	-	13.64
Redbanded rockfish	-	-	-	-	3.76	1.14	-	-	-	-
Redstripe rockfish	-	-	-	-	-	-	-	-	-	-
Rex sole	-	-	25.30	9.10	2.80	7.86	2.62	2.66	-	0.88
Rosethorn rockfish	-	-	-	-	4.04	2.38	-	-	-	-
Rougheye rockfish	-	-	678.00	9.18	-	0.36	-	39.79	11.90	1.44
Roughtail skate	-	3.26	-	3.17	-	-	-	-	-	-
Sablefish	97.96	40.70	12.00	36.38	3.54	45.24	25.52	40.14	2.94	73.90
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	-	-	-	-	1.22	0.92	-	-	-	-
Shortraker rockfish	-	-	48.20	18.70	3.30	-	32.56	28.90	14.18	5.47
Shortspine thornyhead	26.30	9.57	55.93	72.92	32.54	42.38	41.16	95.62	14.11	27.84
Silvergray rockfish	-	-	-	-	28.48	1.86	-	-	-	-
Slender sole	-	-	-	-	-	0.52	-	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	1.50	0.34	-	-	-	-
Spotted ratfish	-	-	-	-	1.84	-	-	-	-	-
Twoline eelpout	0.68	2.77	-	-	-	-	-	-	-	-
Walleye pollock	-	-	-	-	0.76	1.84	-	-	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	3.10	4.17	0.82	4.60	4.78	1.78	5.26	1.81	0.27	1.11
Total	263.32	171.52	927.39	334.85	586.90	532.16	224.78	262.31	55.36	197.80

Species	101	102	103	104	105	106	107	108	109	110
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	3.32	-	-
Arrowtooth flounder	-	2.83	105.18	93.43	19.88	11.93	33.40	3.00	-	2.06
Aurora rockfish	-	-	-	-	-	-	-	0.38	-	0.60
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	3.28	5.64	-	-	-	-	-	0.10
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	13.12	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	1.81	-	-	-
Dover sole	16.93	-	13.25	20.34	19.75	31.50	61.95	34.84	0.52	46.59
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	36.11	-	-	-	-	1.98	20.24	1.86	-	-
Greenstriped rockfish	-	0.20	-	-	-	-	-	-	0.76	-
Harlequin rockfish	-	-	0.22	0.52	0.27	-	-	-	-	-
Lingcod	-	-	-	6.38	-	-	-	-	-	-
Longnose skate	-	-	14.88	7.24	-	3.28	-	-	-	-
Longspine thornyhead	16.74	-	-	-	-	-	19.81	22.51	-	-
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	0.26	-	-	-	-	-	2.06	1.30	-	-
Pacific grenadier	1.69	-	-	-	-	-	1.08	-	-	-
Pacific hake	-	-	-	-	159.20	73.14	4.42	15.52	-	5.36
Pacific halibut	-	-	6.02	-	5.37	7.28	-	-	-	-
Pacific ocean perch	-	26.25	1084.08	1137.98	123.91	66.05	-	-	-	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	11.41	-	-	-	-	-	9.06	-	-	-
Redbanded rockfish	-	-	3.54	1.38	2.30	-	-	-	-	-
Redstripe rockfish	-	-	-	-	-	-	-	-	53.36	-
Rex sole	-	-	3.82	1.24	13.98	17.82	4.93	3.96	0.50	10.50
Rosethorn rockfish	-	1.13	19.92	15.54	0.43	-	-	-	8.24	-
Rougheye rockfish	-	-	1.50	2.88	37.56	73.49	-	127.64	-	173.10
Roughtail skate	-	-	-	-	-	-	1.10	-	-	-
Sablefish	10.36	-	-	-	15.00	6.22	280.11	2.86	-	-
Sandpaper skate	2.22	-	-	-	5.03	-	-	-	-	-
Sharpchin rockfish	-	7.07	1.00	1.20	0.66	0.92	-	-	-	-
Shortraker rockfish	-	-	7.50	-	-	-	64.10	32.52	-	20.65
Shortspine thornyhead	35.06	-	97.30	127.76	61.42	35.80	86.03	143.80	-	67.71
Silvergray rockfish	-	11.97	-	4.24	-	-	-	-	7.87	-
Slender sole	-	0.18	-	-	0.24	-	-	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	4.24	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	0.58	-	-	-	-	-	-	-
Spotted ratfish	-	-	2.95	-	-	1.86	-	-	-	-
Twoline eelpout	1.92	-	-	-	-	-	-	-	-	-
Walleye pollock	-	0.45	-	-	2.44	2.88	-	-	-	-
Widow rockfish	-	1.80	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	1.33	-
Yellowtail rockfish	-	49.04	-	-	-	-	-	-	-	-
Other	2.33	0.25	2.00	0.10	11.50	4.42	8.36	5.96	-	1.91
Total	135.03	118.53	1367.02	1425.87	478.94	338.57	598.46	399.47	72.58	328.58

Species	111	112	113	114	115	116	117	118	119	120
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	2.12	0.97	-	-	1.10	1.18	-	1.53	-	-
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	0.94	-	-	0.50	4.78	0.05	-	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	1.48	0.57	-	-	-	0.80	-	0.97
Dover sole	30.84	24.42	-	-	19.10	-	17.78	30.44	6.30	19.90
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	11.58	-	24.82	32.34	-	-	-	10.70	17.32	3.84
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	-	-	-	0.34	-	-	-	-
Lingcod	-	-	-	-	-	-	-	-	-	-
Longnose skate	14.68	-	-	-	-	-	-	-	-	-
Longspine thornyhead	23.50	-	-	35.16	-	-	6.67	21.64	27.30	15.66
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	2.34	-	6.50	7.60	-	-	6.00	3.61	2.60	2.52
Pacific grenadier	1.70	-	48.26	58.06	-	-	-	2.14	1.44	1.10
Pacific hake	2.45	17.85	-	-	2.22	-	40.12	2.94	-	1.12
Pacific halibut	-	39.62	-	-	-	-	-	-	-	-
Pacific ocean perch	-	115.39	-	-	257.30	1628.06	6.32	-	-	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	1.16	15.58	-	-	-	-	0.26	-
Redbanded rockfish	-	1.51	-	-	-	1.78	-	-	-	-
Redstripe rockfish	-	1.00	-	-	-	-	-	-	-	-
Rex sole	3.83	5.02	-	-	5.90	1.28	5.23	1.55	-	3.12
Rosethorn rockfish	-	-	-	-	-	43.70	-	-	-	-
Rougheye rockfish	-	890.52	-	-	500.08	-	100.53	-	-	-
Roughtail skate	-	-	-	6.01	-	-	-	-	-	-
Sablefish	20.51	1.91	48.84	25.88	-	-	4.73	20.56	34.12	13.06
Sandpaper skate	-	-	0.30	-	1.58	-	3.66	-	-	-
Sharpchin rockfish	-	-	-	-	-	-	-	-	-	-
Shortraker rockfish	-	-	-	-	-	-	10.15	-	-	-
Shortspine thornyhead	30.54	77.21	37.06	12.28	26.60	43.80	75.36	18.27	17.09	18.20
Silvergray rockfish	-	-	-	-	1.74	18.92	-	-	-	-
Slender sole	-	-	-	-	-	0.44	-	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	-	-
Spotted ratfish	-	-	-	-	-	-	-	-	-	-
Twoline eelpout	-	-	-	-	-	-	-	-	-	-
Walleye pollock	-	-	-	-	-	-	-	-	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	1.51	-	-	-	7.12	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	1.41	0.10	1.72	5.88	1.61	1.70	4.46	1.20	28.34	2.67
Total	145.50	1177.97	170.14	199.36	817.73	1753.10	281.06	115.38	134.77	82.16

Species	121	122	123	124	125	126	127	128	129	130
Abyssal skate	-	-	-	-	-	-	-	-	8.08	14.09
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	-	-	2.38	2.62	-	-	-	-	-	-
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Big skate	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	3.47	4.51	-	-	-	-	-	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Cabezon	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	1.60	0.40	0.86	-	-
Dover sole	-	8.04	2.44	13.60	2.94	1.96	4.27	-	-	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	11.82	17.22	13.18	51.18	22.30	36.52	35.70
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	9.28	-	-	-	-	-	-	-	-	-
Lingcod	-	-	-	-	-	-	-	-	-	-
Longnose skate	-	-	-	-	-	-	-	-	-	-
Longspine thornyhead	-	-	-	13.97	10.53	35.00	44.12	25.76	1.02	1.30
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	-	-	-	1.63	0.74	1.78	8.43	5.44	9.67	4.66
Pacific grenadier	-	-	-	1.94	8.16	7.24	84.02	49.86	83.10	35.44
Pacific hake	-	2.32	10.00	-	-	-	-	-	-	-
Pacific halibut	-	-	-	-	-	-	-	-	-	-
Pacific ocean perch	219.63	388.64	622.77	-	-	-	-	-	-	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	1.39	18.26	16.40	30.19	12.20	0.68	3.74
Redbanded rockfish	-	-	-	-	-	-	-	-	-	-
Redstripe rockfish	-	-	-	-	-	-	-	-	-	-
Rex sole	-	11.37	2.25	-	-	-	-	-	-	-
Rosethorn rockfish	10.22	0.64	55.15	-	-	-	-	-	-	-
Rougheye rockfish	320.28	2235.56	766.27	-	1.64	-	1.21	1.40	-	-
Roughtail skate	-	-	-	-	-	-	0.16	4.33	1.04	3.04
Sablefish	-	-	-	28.46	79.30	99.52	206.54	83.76	-	-
Sandpaper skate	-	-	-	1.38	-	-	-	-	-	-
Sharpchin rockfish	-	-	8.21	-	-	-	-	-	-	-
Shortraker rockfish	6.10	-	139.17	-	-	-	-	-	-	-
Shortspine thornyhead	4.78	65.57	102.82	17.37	0.58	17.60	12.72	14.04	6.07	0.64
Silvergray rockfish	-	6.00	1.50	-	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-	-	-	-	-
Southern rock sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	-	-
Spotted ratfish	-	-	-	-	-	-	-	-	-	-
Twoline eelpout	-	-	-	0.92	0.20	0.20	0.37	-	-	-
Walleye pollock	-	-	-	-	-	-	-	-	-	-
Widow rockfish	5.76	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	56.14	-	93.44	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	7.20	-	3.50	1.77	0.95	0.20	15.45	31.18	12.25	2.00
Total	639.39	2721.61	1814.41	96.87	140.52	194.68	459.06	251.13	158.43	100.61